Economic Drivers for ‘Room for the River’

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Preface

This paper is part of the Freude am Fluss (FaF) project. The FaF project is focused on the opportunities of changing water management regimes for alternative spatial planning, flood-awareness and new economic development. It is a co-operation between German, French and Dutch knowledge institutes and universities and government departments. A key component of FaF is the active incorporation of all river basin stakeholders into the design and decision making processes around alternative spatial planning, the so-called Joint Planning Approach (JPA). The Joint Planning Approach in FAF incorporates the thinking that the performance of water systems has an ecological, social and economic dimension. It assists the capturing of the total economic value of innovative regional planning by measuring the economic value realized by managing the multi-functional dimensions of water systems. The JPA is supported by various documents that elaborate on specific important elements. One of the elements of JPA is the economic base of the projects, in other words, the economic drivers for the realistion of ‘Room for the River’.

In this paper we describe the different types of economic drivers and make an analysis of the way they play a role in two case studies. We first describe developments in the approaches to water management and its economic consequences. We introduce the concept of economic drivers and illustrates how economic values may stimulate or hinder new policy approaches. A distinction is made between economic gains at macro and at micro level. At macro level, the increase of welfare is identified. At micro level it is about the gains for specific individual firms, consumer households or governmental entities. At micro level real cash flow streams are accounted for that are generated by the implementation of the ‘Room for the River’ concept. Both macro and micro gains can be identified and valued in an explicit or implicit way. Explicit means that these gains are accounted for in formal statements, such as societal or private cost-benefit analyses or cash flow statements. In an implicit way these gains be considered by the participants of decision makers in the ‘Room for the River’ concept not in formal statements, but in their assessments of policies and projects by using non-financial and non-monetary criteria.
This paper ends with conclusions about the economic consequences of applying the ‘Room for the River’ concept. In general it addresses the issue that not all economic gains to a society, which can be captured by the concept of welfare, will drive water managers towards the realization of these gains. Different pathways to transform such gains at a macro level into true micro level cash flow drivers for individual stakeholders are presented.

In the second part of this supporting document for JPA, we elaborate in the institutional arrangements that stimulate the economic drivers into practical cash flows. It deals with the role of institutions in water management and illustrates how economic drivers can be embedded in the process of decision-making, project developments and assessments. The (re-) design of institutional arrangements that give water its new place in planning approaches is based on the assumption that individual stakeholders should be rewarded for acknowledging the economic values of water systems.

1. Introduction

The realisation of initiatives to improve the planning of geographical areas with the aim to integrate the threats and opportunities offered by water systems often fail as a consequence of so-called "economic unfeasibility" (Schuijt). From the perspective of economics, however, it is often questionable how economic feasibility of initiatives are defined and determined. For example, "economically unfeasible" can be used to indicate a lack of capital to finance a project, a lack of profit at the end of the implementation of the project, or, alternatively, a lack of acceptance by certain groups of stakeholders of an initiative. Especially in the case of the latter, where a regional plan can be rejected on the basis of the strength of power of particular stakeholders, questions as 'what does economic feasibility actually means?' do arise. Who benefits and who loses? And, can the losers in a regional planning be compensated by the winners? Are all economic drivers for the realisation of a regional plan considered by decision-makers? This paper touches on these issues by addressing the question of which economic drivers can be identified for one type of regional planning, more room for the river, and subsequently how these economic drivers can be turned into real cash flows to finance 'Room for the River' programs.

The behaviour of stakeholders in a water system is an outcome of a process that is highly complex. Management of water quantity and quality is becoming the focus of an increasing number of stakeholders, ranging from governmental agencies, the business sector, non-governmental organisations and the public (van Buuren). Authorities responsible for water management face the challenge of coordinating with a variety of stakeholders involved in topics such as water supply, waste water treatment, protection from the sea (sea level rising), salt water intrusion, river water discharge, flood management and groundwater contamination, all within an increasingly complex institutional context (Teisman). The institutional context can be defined as the set of the formal rules (such as national and international legislation) and informal rules (cultural customs and regional traditions), which make up the rules of the game for stakeholders. Additionally, natural rules exist that influence stakeholder behaviour: seasonal weather patterns and climatologically determined conditions. Natural rules are often known as ecological rules (such as population dynamics) or physical rules, which creates the hydrological characteristics of a water system (such as water flows, speed and water quantities). As figure 1 illustrates, these rules are strongly interrelated. In chapter 6 of this paper both natural and institutional rules that together determine the feasibility of economic drivers are elaborated, creating ground for mankind to intervene in its water systems.

Sometimes the rules are set by stakeholders and are meant to protect the natural conditions. Often rules set by stakeholders are drivers that create negative impacts on these conditions. Within deltas' often short term oriented drivers or drivers that focus only on the stakes of one or a limited set of stakeholders, conditions necessarily for agricultural and economic activities may hamper recreational activities. Political processes, inspired by principles, power and individual gains and losses, shape the importance of specific rules and its final impact as a driver on the behaviour of all stakeholders. Therefore, coastal zones are dynamic and the natural and economic processes that shape physical, economic and institutional contexts undergo constantly changes. Preventing future stakeholders in water systems of a delta from the impacts of current behaviour may be very economic and ecological sound, if the time horizons are extended from five years towards a scope of 25 or 50 years. A preventive approach to managing the water systems in a

delta has this long-term time scope. The need for awareness about the urgency for integrated and coordinated action to ensure water as a sustainable resource was highlighted by the third World Water Forum in Japan (verwijzing) and by many other governmental and private business groups. What these actors consider as significant and what are the key issues depends on their own cultural and socio-economic value system. Hence, many different approaches towards managing water systems exist. Each approach builds upon its own principles, scenario’s and knowledge. Water is so thoroughly integrated into human activities and ecological systems, that when dealing with the environmental, social and economic issues of sustainable development water dimensions often play an important role.

Managing water starts with having insight in the qualitative and quantitative dimensions (stocks and flows) of water systems. However, these physical characteristics are often directly related to human behaviour, such as transportation and the use of information infrastructures and water technologies. Therefore, managing water systems imply managing those decision-making processes that pertain to those human activities with such a significant impact on the level that water objectives (qualitative and qualitative) are achieved. How a general aim of striving for sustainable development is embedded in water management depends on how the final decision-makers interpret the concept of sustainable development. Huge differences may exist between countries and regions and among stakeholders. Regional planning and managing water systems in different countries and regions may also have similarities. But in the end, differences exist that may strongly affect the performance of the coastal zone management illustrating how economic feasibility is determined. The flood risks may be limited in heavy populated areas with solutions coming from an approach by keeping water out by adequate dams provided by a society with a strong economy and enough funding capacity. However, the situation may be drastically different when there is a shortage of funding capacity and natural context which puts its hydrological and ecological limits to keeping water out of coastal zones by the use of dams. Different approaches to regional planning may still have in common that they use the same decision and discussion supportive tools. This enhances to think more in a consensus alike manner about the long-term effects of human impacts in the water systems and an orientation on a wider set of stakeholders. Economic, social and ecological gains can be generated, that can be used to compensate or overrule the limited set of stakes of a smaller part of the natural context of rivers and a delta. This approach will only work when causalities between the physical, institutional and ecological systems are identified for which a multi-disciplinary approach is demanded to create the knowledge basis in which the rules of the game to govern water systems are shaped.

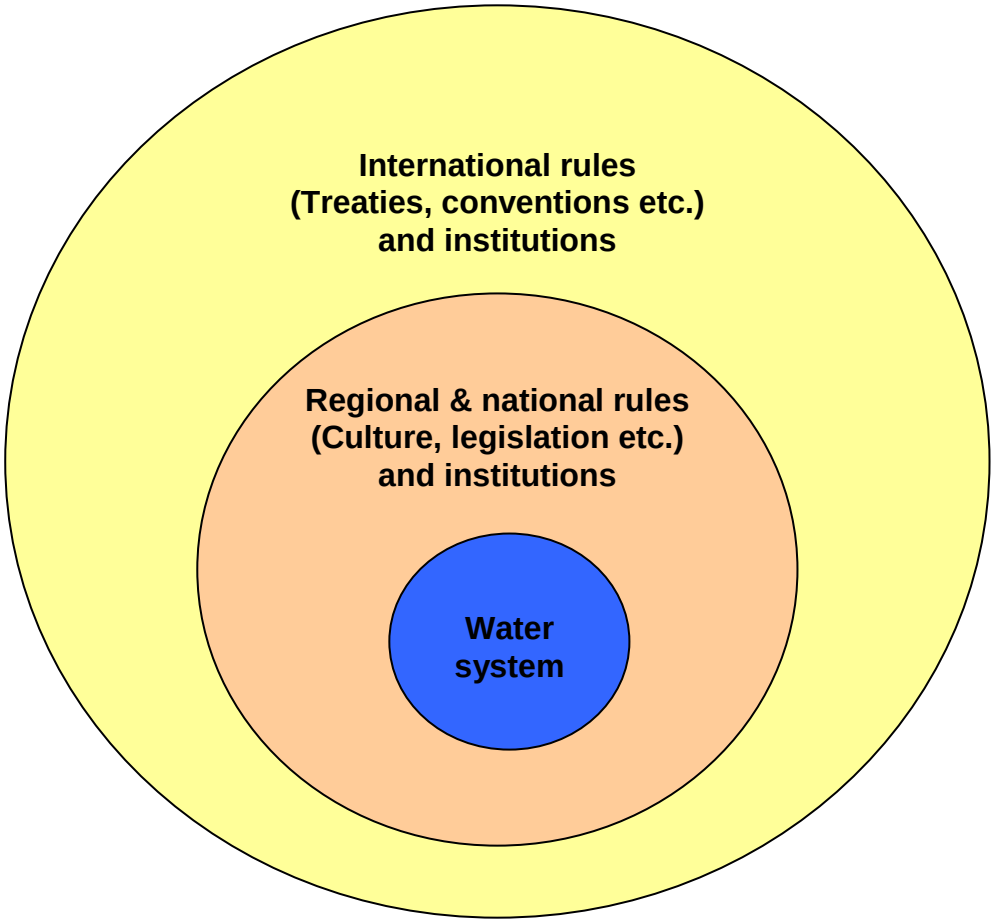


Figure 1: Institutional setting

2. New Approaches to Water Management

2. 1 Introduction

Rapid economic development in many countries in Europe, in particular over the past decades, has put increasing pressures on freshwater resources. In the Netherlands these pressures - often stemming from high population growth rates, agriculture, navigation and fisheries - have manifested itself in the canalisation and normalisation of major rivers, the adaptation of shorelines and the reclamation of land from the sea for the construction of polders. Economic interests were driving the "command-and-control" policy paradigms in the Netherlands and major infrastructural projects were implemented, including the construction of dikes, levies and the cutting off of river bends. The result was a deterioration of healthy functioning freshwater ecosystems and a water system, which was almost entirely controlled and managed by humans for economic interests. Clearly, the relationship between human behaviour and impacts on water systems has been closely related since the existence of humans.

The key driver of interventions in the Dutch water system has been, and still is, safety. The geographical location of the Netherlands in a river delta meant a continuous struggle against floods. The first flood-protection measures were already taken in the first and second century before Christ. Remains of dikes were found in the north part of the Netherlands, in Frisia. In 1000 AD settlements that lived along rivers and by the sea started systematically protecting their belongings. The monks build many dikes in the Flemish (Belgium) part of the Netherlands. Later everywhere in the low lands, rich traders invested in productive land by constructing dikes around farmlands. In the 20th century the scale of land reclamation increased and large polders were created in the former Zuiderzee near Amsterdam. In the 1960s, the major part of the Delta Plan was realized, which closed most of the large sea arms of the delta in the Southwest of the Netherlands as an answer to disastrous flooding in this part of the Netherlands in 1953[1].

Starting at the end of the 1960s, the environmental impacts of "command-and-control" management approaches were suddenly noticed. The negative environmental consequences of the Delta Plan that became apparent in the 1980s and the realisation that human pollution in the Rhine had turned it into a "dead river" were among the issues that contributed to a paradigm shift in water management policy. This shift was compounded by periods of extremely high river water levels in 1993 and 1995 resulting in floods, as well as periods of extreme droughts in 2003 and 2006. A realisation emerged that a healthy functioning water system is crucial and that water management can no longer be limited to only one single (economic) interest. A new approach called "integrated water management" emerged, which puts the functioning of the entire water system at the centre and balances economic, ecological and social interests and needs.

Integrated water management manifests itself in a variety of approaches, each of which contain different elements, yet common to most approaches is the focus on a more holistic approach to water management as a water system and the balancing of economic, environmental, and social benefits that accrue to a wide set of stakeholders.

[1] Koniklijke bibliotheek [http://www.kb.nl/dossiers/watersnood/watersnood.html]

a) *Economic Benefits*
Economic benefits reflect the creation of welfare of a society and can be divided into goods and services of freshwater ecosystems. Economic goods include drinking water, fish, clay and sand. Economic services include flood control and water quality control of river plains, wetlands and watersheds (including forest landscapes) and tourism. The classification of an impact on welfare is strongly related to economic valuation process.

b) *Ecological Benefits*
Ecological benefits focus specifically on increased biodiversity in river basins. These environmental benefits include river basins as living space for species like fish and birds, diversity of river landscapes (forests, wetlands, floodplains) and dynamic ecosystems (nutrient rich, versatile). The classification of ecological effects as benefits is strongly related to the definition and interpretation of ecological quality.

c) *Social Benefits*
Social benefits include elements of "enjoyment" related to nature (recreation and tourism, living space) and sustainability aspects (future generations), but also social justice and equity. The positivley perceived changes in the allocation of economic benefits and costs to specific stakeholders are strongly related to the adoption of certain policy principles such as the Polluter Pays Principle.

What important is to note in this respect is that in most cases the realisation of regional plans have benefits to society that are neither pure economic, social or ecological. The impacts cannot be captured within one dimension for all stakeholders. The key of integrated water management is to approach the water system as a whole, from upstream to downstream, and balancing upstream-downstream stakeholder interests and needs. Table 1 shows the different combinations of the impact of the benefits.

Economic benefits	Social benefits	Ecological benefits
X		
X	X	
X	X	X
	X	X
		X
	X	

Table 1: Water system performance: three dimensions of the impact of regional plans.

In the Netherlands are several institutions involved in these new approaches of water management. The key drivers are governments, non-governmental organisations (NGO's) and academic institutions, often in close collaboration with each other and with the private sector. A good example is the Freude am Fluss (FaF) project which this paper is part of. A key component of FaF is the active incorporation of all river basin stakeholders into the design and decision making processes around alternative spatial planning, the so-called Joint Planning Approach. The Joint Planning Approach in FAF incorporates the thinking that the performance of water systems has an ecological, social and economic dimension. It assists the capturing of the total economic value of innovative regional planning by measuring the economic value realized by managing the multi-functional dimensions of water systems. If innovative regional planning implies a sound combination of, for example the housing function of riverbeds (like the use of floating houses)

and the transportation function (transportation by boats and transportation by trucks over roads) a net economic benefit should be gained.
These objectives are achieved by the design of the so-called Capturing -Total Economic Value Framework (C-TEV framework). In this framework the economic gains are to be recognized by the stakeholders in water systems and this should motivate them to enhance innovative regional planning in which the multifunctional thinking of water systems performance is embedded. The framework describes the steps that can be followed to identify the economic drivers for a management approach to rivers and the design of institutions that transform economic drivers into the identification of current and future cash flows related to these drivers. By using this approach economic drivers may become strong financial drivers for individual stakeholders.

A second example of a project heading to the indentification of economic drivers is the One Europe More Nature Program of the World Wide Fund for Nature (WWF). WWF is collaborating with local knowledge institutes, governments and the private sector in river basins in 6 EU member states to identify, create and communicate practical examples of alternatives for rural development in Europe, that are good for people and for nature. At the foundation of the project is the Living Rivers concept aiming at conserving nature from "source to sea". For example in the Netherlands, WWF is working with Stichting Arc in the Rhine river basin in the Gelderse Poort, where a new economy is being built that is not only helping to restore ecological processes and landscape quality, but is also creating new jobs.

2.2 Changing paradigms

Possible options of applying economical drivers are highly depending on general processes in society regarding the organisation of the society and the management culture. In this context, institutional stimuli and constraints for implementing the new concept of river basin management are part of a broader historical development of paradigmatic change.

In recent years, the responsibilities of the water managers have been changed considerably. In the past, water managers only concentrated on the supply of water and the protection against the water. In the eighties of the last century new sectors regarding the water system gained importance. For example: water quality management, ecosystem management and even supply management. They all asked for attention of the water manager. Traditional services of the water system, like navigation, drinking water, fishing and extraction of clay, sand and gravel, were also of importance in the urbanising society. Trying to find an optimum in all these sectors at the same time resulted in a sub-optimal situation on the level of the total water system. After being confronted with the negative results of this management of water sectors, the awareness raised that the whole water system including its ecosystems should be the focal point. Integrated water management was born and since that time has been the dominant paradigm for the modern water manager.

In the 21st century new challenges arose, like the participation of stakeholders and public in policy-making and project development. These are extremely important innovations for the water managers in these times. Interaction with stakeholders and public is required by the European Water Frame Work Directive (EU, 2000). The development towards more participation fits in a global evolution in the water management paradigm, where step by step a development towards interactive management of international river basins can be identified (Van Ast, 2003).

The interactive approach in water management is a view on how to deal with the wet environment. It is based on the awareness that man is in a mutual relationship with his surroundings. It implies not only respecting natural water systems, but also having an open mind for social systems that influence behaviour towards the waters.

The interactive view can be found in two different interactive relations:
1. Between the water manager and the actors in society, both the general public and the different stakeholders;
2. Between the water manager and the factors of the water system, the whole of interrelated physical, chemical and biological components.

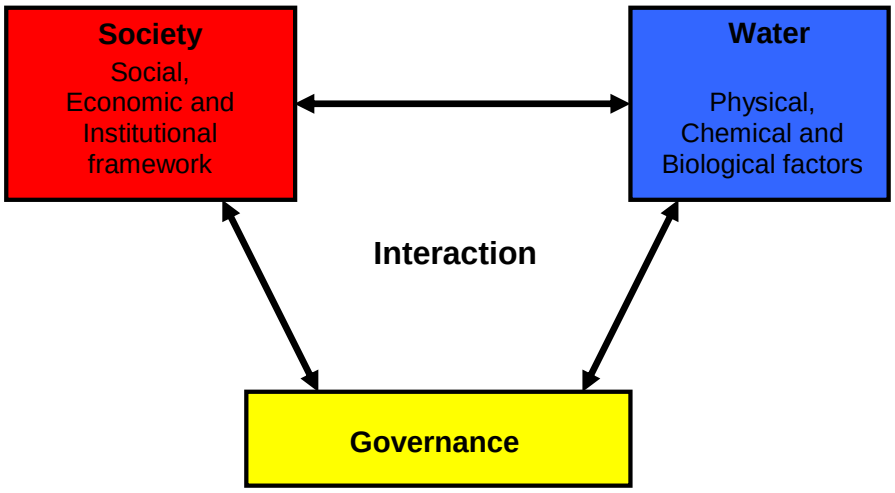


Figure 2: Interactive Water Management; water managers govern in an interactive way both the society and the water system.

The time that water authorities, just like other governmental institutions, could decide about plans, projects and policy aims independently (without involving society) have been left behind. Water managers should monitor relevant processes in society at all times (van Ast and Boot, 2003). This makes it possible to adequately react to changes in human behaviour that have impacts on water systems. In addition, monitoring societal processes makes it possible to react to opportunities for the development of new policy approaches. At the same time, water managers' relationship with water systems should in the interactive concept also be based on interaction. Interaction with the water systems means that interactive water managers are in a continuous dialogue with the water systems (i.e. the different ecological parameters). At every moment they have an overview at their disposal of the state of the river system they manage. This requires intensive monitoring of chemical, physical and biological parameters.

One of the three arrows of interaction in the figure mentioned above refers to the relation between society and the water system. Water systems are structures of water connected physical, chemical and biological factors that together maintain an ecological system (Van Ast, 2000). It appears that the more time goes by, the less people are interacting with their natural

surroundings. Can we expect from inhabitants of urban areas that they understand the value of a healthy water system if they do not even have the chance to come into contact with nature? Nowadays, children are educated in many profession-related disciplines. However, the time spent on teaching interdependencies with the natural environment, is only diminishing. At the same time, our cities leave only small opportunities for children to feel, for example, elements of water systems. This deminisch of basic interaction between people and planet makes participatory decision-making more difficult.

River systems are specific water systems because their watercourses bring the water of a certain area (watershed) to a geographically lower point, in the end mostly to a sea. Interaction between water manager and the water system consists of continuously monitoring all possible changes in the system. An interactive approach requires the continuous monitoring of a wide range of system parameters. This enables the water manager to know, at every requested moment, the conditions of its policy object. The monitoring must be operated on the level of the water system in order to understand developments in connected areas. Taking the water system as a starting point for management means that new operations should never be large-scale solutions that are everlasting. If only small process changes are generated, corrections have less severe consequences. This means that the interactive management style is based on incremental changes, constantly fed by feedback from the systems they deal with.

In the water system of the Rhine basin many efforts have been made to change the river to enable specific sectors of human purpose, like shipping and land use. It resulted in an increasing risk of flooding. In February 1995, the danger was so pronounced, that in the Netherlands about 200.000 people (and 700.000 pigs, 700.000 cows and a million chickens) had to be evacuated. The high water levels were caused by the total of, mostly small, man made physical changes in the river system. Everywhere small parts were taken from the high water riverbed. In this way the space for the river in periods with much precipitation decreased considerably and leads to extremely high peaks in water level. Comparable with the Mississippi floods of 1993, the process is worsened by the removal of nature areas that originally absorbed rainfall like a sponge, the construction of drainage and the covering of the land with hard materials, like roads and buildings, had similar results in peak discharge. Both processes combined make the discharge peaks larger and larger.

Recent awareness of these facts and the near disasters with floods resulted in a broad range of plans for "returning land to the river" in order to restore essential functions of the river system. In the form of "eco-restoration" it can, amongst others, be found in an increase of projects of changing agricultural use of flood beds to nature areas. The return of the salmon learns that these rehabilitation projects are slowly getting some successes. In the Rhine basin, salmon was spawning from 1992 in the River Sieg, a relatively natural tributary at the lower parts of the German Rhine. In other rivers, both in Europe (ECRR, 2003) and in the United States (American Rivers, 2003), similar activities are being realised. In the Netherlands, many restoration projects of smaller rivers and tributaries are being undertaken, like the Vecht, Dommel, Koningsdiep, Drentse Aa, Roer and Geul. With respect to the River Allier, tributary to the Loire, dams and weirs have been removed to let fish pass. According to American Rivers (2003), at least 470 dams in the USA are removed and another 100 removals are in discussion. An example is the hydropower facility at Fossil Creek, a tributary to the Verde River in Central Arizona. Only the fact that was decided to start these costly projects means that society values these natural systems. It also means that rehabilitation of natural river systems in itself already can work as an economic driver.

2.3 Changing societies

The shift towards interactive water management is embedded in more general trends in society. Van der Bruggen & Rotmans (2006) conclude that a transition takes place towards integrated water management, forming part of a larger transition to a sustainable society. There can be interpreted that the search for sustainable development are the new major trends in the (post) modernisation process, with eye-catching trends like globalisation, internationalisation and regionalisation. Disappearing value of national borders is especially a powerful trend in Western society. In water management there can be observed that the revival of the river basin approach is a basis for responsible management of water (Teclaff, 1996).

Another example of a major trend is the "economisation" of society. Decision-making is dominated by financial criteria. Since common economic thinking does not concern long term effects and non-financial consequences, most environmental factors are many times not adequately taken into account. A further tendency with relevance for water management can be called "horizontalisation". The "command and control" paradigm that allows hierarchical government agencies to determine citizens behaviour is substituted by a horizontal model in which governments take opinions of inhabitants into consideration. Stakeholders not only are heard, they are invited to think together with the government agencies about the best solutions.

Sustainable development itself is shown in the way modern water managers deal with their water systems in the ecological or adaptive environmental management approach, in which government adapts its policy to the processes in ecosystems (Allen et al., 1992; Coape-Arnold et al., 1995). This view results from the awareness that every water management starts with (the integrated character of) the water system itself. While for every decision and for every management reliable data necessary are, a very important condition for successful water management is the monitoring of indicators that provide information about what is going on in these natural systems. In the earlier phases, these data were gathered only at the moment a decision had to be made, without data collection until the moment the information really was needed. Every time a new problem arose, a new research had to start. In the interactive approach however, water managers continuously gather data of many different physical, chemical and biological (system) parameters. The results are put into (for example GIS-based) models that consider all kinds of relations. The models are updated constantly, according to the latest evaluations. At every point in time an overview of the state of the art can be made. In this way, the interaction between water managers and their water system can be characterised as a "dialogue" (Saeijs, 1995). In current international water management of Western Europe and Northern America some promising examples of this dialogue can be found, as already shown in this paper. With respect to the interaction with the river system, it resulted for example in various restoration projects of the natural dynamics of the water level.

Adaptive models, like described above, demand choices and trade-offs. The selection of these is driven by values through an active public participation, which contributes to the information gathering, analysis, decision-making, implementation and capacity building and monitoring and evaluation of projects. Vitousek et al. (1997) assume that there are no isolated natural systems and no isolated social systems. Human beings are an integrated part in every natural ecosystem and there is a recursive and interconnecting influence among them with their interactions, interdependence and dynamics; one speaks of social-natural ecosystems and of integrated human ecosystems, where the human being is the main agent. The integrity of these ecosystems depends

on the adaptive capacity of overcoming a crisis or shock; this depends on ones’ resilience and endurance capacities.
All this complexity within social-natural ecosystems needs an institutional and leading culture, which is completely different from the traditional ones, demanding a structure, which takes horizontal decisions in an adaptive institution based upon learning processes.

This concept of adaptive management is applied to a scope of scales, which vary from landscapes (large ecosystems at a regional scale) to river basins (Cortner and Moote, 1994; Coape Arnold et al., 2003), amongst others being defended by land use planners (Briassoulis, 1989; Lajeunesse et al. 1995). In this way, the ecological introspections of ‘traditional’ adaptive management are combined with social learning (Lee, 1993) and with the perspectives of the social institutions (Gunderson et al., 1995; Dovers and Mobs, 1997) so as to include important stakeholders, to balance the distribution of power among the stakeholders and endeavour towards processes of solving conflicts and find agreements. According to Pahl-Wostl (2003), the concept of social learning can be described as ‘learning by groups – authorities, stakeholders and experts – to handle issues in which all group members have a stake’ such as the management of a river basin.
This long-term learning-processes require a continuous participation and ‘capacity building’, which converges to a ‘collaborative and adaptive capacity’ that possibly builds up to awareness, knowledge, skills and operational capabilities. The application of the ecosystem approach in the natural resource and environmental management will help to achieve a balance between conservation, sustainable use and equitable distribution of benefits. This emphasis is based on the application of appropriate methodologies in the different levels of organisation, which include the essential structures, processes, functions and interactions between organisms and their environment. The organisation recognizes that people with their cultural diversity are an integral component of many ecosystems. There is no single way of implementing the ecosystem approach, as this depends on local, provincial, national, regional and global conditions. But there is no doubt that the concept ‘Room for the River’ is part of the ecosystem approach. In the following chapter there is an elaboration on the economic consequences of this concept.

3. The Capturing-Total Economic Value Framework

One manifestation of new management approaches is ‘Room for the River’, a policy paradigm dominant all over Western Europe since 2000. Driven by safety, it aims at giving enough space to rivers to drain their peak flows. As opposed to increasing dike heights to prevent floods, more ‘Room for the River’ aims to bring back the natural river flood plains and wetlands to act as buffer capacities in case of increased river water levels. Through history, these flood plains have disappeared due to the construction of dikes and industries and towns have moved into what was once a river flood plain. Not only has this process resulted in what is known as a “pseudo” feeling of safety of people living behind the dikes (the floods in 1993 and 1995 in the Rhine basin have shown that dikes are not necessarily the answer to floods) it has also increased the costs of floods, because the economic value of land surrounding rivers has increased and with it the cost of floods. Furthermore, climate change is expected to increase peak flows in the river over time, resulting in more frequent floods and a higher risk to towns, industries and with it human lives. Further down the line, more room for rivers may imply not only the return of wetlands and floodplains, but also the resettlement of towns and industries, moving infrastructure and roads, as well as the designation of emergency flooding areas.

It goes without saying that measures involving the creation of more room for the river involve high costs. The question is whether more room for the river will provide real net economic benefits to society and individual stakeholders in the long run that justify the high investment costs. Crucial in this decision-making process is the long-run trade-off between costs and benefits of increasing dikes on the one hand and the restoration of river flood plains and its associated activities on the other hand. This paper focuses specifically on identifying the latter: what type of economic benefits exist that can drive more ‘Room for the River’ and how to turn these economic drivers (or benefits) into financial cash flows to finance ‘Room for the River’ projects. Scheme 1 outlines a framework to capture the total economic value.

The Capturing-Total Economic Value Framework
This framework can be used as an approach that guides policy makers towards the identification and generation of economic values of the ‘Room for the River’ concept. It consists of three steps.

Step 1: Create a policy setting that links regional planning with river management (both water quantity and water quality control).
Formulate a formal statement in which the multi-functionality of rivers is acknowledged. The link between regional planning and river management should be organized. The following questions may be raised to the relevant stakeholders of the policy process:

1. What are the physical, social and ecological effects of regional planning? To what extent represent these effects a change in the total economic value of the river and for who are these economic drivers relevant?
2. How can the decision-makers account for the total economic value?

Step 2: Identify and/or (co-)design cost effective projects that enhance the concept of space for the river (a multi-functional approach to rivers).
The set of project can for example consist of the construction of houses and dikes. The set of projects should have as a result that the river performs its functions with its economic, social and ecological gains and losses.

Step 3: Design of institutional arrangements that should create drivers for stakeholders based on the generation of economic gains.
Four types of institutionalisation processes are very important:

1. The establishment of an organisation that enables decision making processes (participation of stakeholders and regulated use of formal costs-benefit approaches, Public Private Partnerships);
2. The development of a clear policy wit a project plan to create space for the river;
3. The release of resources like cash flows, labour and machines;
4. The use of suitable policy instruments, if possible economic instruments, like subsidies and levies, that go together with the accounting practices at macro and micro level, which enables interaction with stakeholders. As a result stakeholders can be informed about the impact of the regional plans on their costs and benefits. This does not necessarily have to be in the form of a formal cost benefit analyses.

Through answering the questions in step 1, the gains and losses are identified and quantified in economic terms in the decision making process. Decision-makers should decide on how these economic costs and benefits are to be integrated into the decision making process. It is suggested that the following tools and policies can be followed:

- The use of Societal Cost Benefit Analyses with explicit valuation of social and ecological gains and losses: the economic value is calculated by using a valuation technique and management accounting systems.
- The use of Societal Cost Benefit Analyses by presenting only those gains and losses represented by market prices.
- Participation of stakeholders in the decision making process that integrates their economic gains and losses as stakes into assessment of plans following their own accounting practices. The stakeholders may present their own accounting formats for performing their cost-benefit analyses (so-called private cost-benefit analyses).

Step 2 shows that river management and regional planning can enhance the integration of economic drivers by creating policy instruments that integrate the economic drivers into decision making processes on the basis of regulatory push factors (such as levies paid by stakeholders who enjoy some functions of the river) and or creation of financial stimuli (creation markets for attributes of the regional planning approach such as floating houses, increased market value of housing, revenues of concessions for fishery or drink water concessions).

Step 3 considers the institutional embedding of the drivers. The following section takes a step back to explore what types of economic drivers exist for new water management approaches in general; taking the lessons learned both internationally and nationally. Afterwards selection of drivers is identified that potentially play a role in more 'Room for the River'.

4. The concept of Economic Drivers

4.1 Introduction

Economic drivers refer to the perceived benefit of a value that actors attribute to a certain consequence of a decision. The benefits of new water management approaches can be assessed from two perspectives: those benefits that accrue to society as a whole (macro-economic drivers) and benefits that accrue to individual stakeholders (micro-economic drivers). Table 2 summarizes these drivers. If the benefits are associated with real cash flows, the economic drivers are simultaneously financial drivers. However, many economic benefits and costs are not associated with real cash flows. For example, the value of a house may increase as a result of regional planning, but as long as a family lives in this house the gain is not necessarily associated with cash flows. On the other hand there is an increase in property tax value. Another example is recreation in and around a river that is not associated with actual cash expenditures because the river is freely accessible to all. But the revenues from public transport to this area should also be taken into consideration. It is often regarded as a pitfall that the real cash flows are not clear. In the determination of the economic feasibility, innovative ways of integrated water management may be regarded as economically unfeasible due to a lack of insight into the true economic value of regional plans that integrate the water systems in an optimal way.

Type of Economic Driver	Description
1. Macro-economic drivers; Economic gains related to:	
Water quantity	Prevention/mitigation of floods (increase of safety, storage of drinking water and process water for industrial and agriculture activities)
Water quality	Improved basics of drinking water quality, eutrophication reduction, sediment quality
Erosion control	Control of land slides and sedimentation of rivers
2. Micro-economic drivers: Cash flows related to:	
Water quantity	Reduction of costs resulting at availability of water to hydro-electric companies and bottling companies
Water quality	Increase of revenues and reduction of production costs resulting from improved quality of water as production input for bottling companies
Erosion control	Reduction of expenses related to less siltation of river water as production input to bottling companies and hydro-electric companies, and less siltation of the beds of rivers as transportation systems for the shipping industry
Clay mining and brick factories	Revenues of improved clay mining practices. Reduction of expenses of water boards and communities resulting from improved water retention.
Tourism	Increase of revenues of nature-based tourism and recreation.
Fishing and hunting	Recreational fishing licences, water bird hunting rights
Housing industry	Increase of housing prices in nature areas
Sand extraction	Revenues of sustainable sand extraction leading to restoration of ecological process and improved corporate image.
Products of nature	Revenues of the production of wood, tree and reed stems, 'green' vegetables

Table 2: Examples of macro-economic and financial drivers of new water management approaches.

4.2 Economic good and water

Clearly, water is an economic good and the concept of economic drivers can be used to stimulate policy concepts that increase welfare by addressing its economic benefits. However, water is not *just* another economic good. In the beginning of this chapter water is characterized as an economic good, as has been done by the United Nations. But not everyone agrees with this approach. The water management practice, especially on the drinking water issue, has been focused on the optimistic approach and, in that way, has left out some very critical factors. When

looking at sustainable water management, it is not sufficient to only create a market for it. This is mainly because costs are certainly not the only factor that creates equilibrium between supply and demand (Van der Zaag and Savenije, 2006). Savenije (2001) lists various attributes of water, which makes it very different from other products, which are also vital for human survival and economic prosperity. Six of these factors are explained here:

Water is essential

As has been shown earlier, humans and other organisms cannot live without water of a certain quality. Water is vital to every human activity.

Water is non-substitutable

There is no substitute for water. As was shown in the short part about the two economic theories, the ground rule is that people can makes choices and with that show their preference for a certain product and supplier. But for water there is no alternative, aside from the various qualities. One exception is coastal cities that could make fresh water from salt water through desalinisation at a high cost.

Water is finite

The amount of water that can be used for human purposes is finite. The amount of fresh water, compared to the total amount of water, on the planet is very small and it depends upon the water cycle.

Water is fugitive

Water flows under gravity and therefore is a very dynamic good. Water demands vary over time and so does supply. At one moment there can be an excess, which can cause a flood, and at another moment a drought can take place because of a shortage of water. A water system is a constant flux, contrary to a stock like air.

Water is a system

The system of water, from evaporation through rainfall to runoff, is complex entailing numerous steps, which are interconnected and interdependent. This fact is important, because the water that is used upstream in the water system is not available for use in the areas downstream. When assessing the value of water, the runoff position is important in the water system (Hoekstra et al., 2001).

Water is bulky

Water is hardly ever transported over a considerable distance, especially not upward stream. This is contrary to other commodity goods, which are shipped around the globe in big tankers.

Table 3 compares the different attributes of water to other important commodities. This gives a clear view of the important status of water.

	water	air	land	fuel	food
essential, vital	+	+	+	+	+
scarce, finite	+		+	+	+
fugitive	+				
indivisible	+				
bulky	+	+	+		
non-substitutable	+	+	+		

Table 3**:** Comparison water and other commodities (van der Zaag and Savenije, 2001; pp. 14)

Van der Zaag and Savenije (2001) argue that water is an economic good, but a very special one. They state that just letting the market decide upon the price of it, does not result in the most favourable allocation of the scarce good water. They argue that water should have a set price (often combined with cross-subsidies). The set prices sends out a message to users that water is a scarce good and should be treated that way. They view the economics of water from the pragmatic approach, which is about informed choices of use.
When putting a value of water is coupled to the economic value of water in water systems, there can be conclude that putting a price on water, which is more realistic than the market price that is used now, can also help people in understanding the need for change in water management. Water is often seen as an enemy and can do a lot of harm, but water is essential for our survival and a special commodity and should be treated that way.
Besides the economic values of water, also several socio-cultural values can play a role in the view of the public on water (systems).

4.3 Socio-cultural values of water

The socio-cultural values of water are distinghuised in different aspects. First the cultural-historical aspects, safety and risk aspects and religious values related to water systems are discussed. Followed by the recreational values of water. In the ‘Room for the River’ project opportunities are seen in the new river management system for an enhanced relationship between people and nature. The experience of nature is related to the measures in the ‘Room for the River’ project and the combination of water and nature development. Lastly the intrinsic value of water systems is taking into consideration.

4.3.1 Cultural-historical aspects

The Netherlands has been fighting against water for centuries. Almost all events in the water history of the Netherlands are about a battle against the water. The figure below shows the most important and well-known events in the Dutch water history.

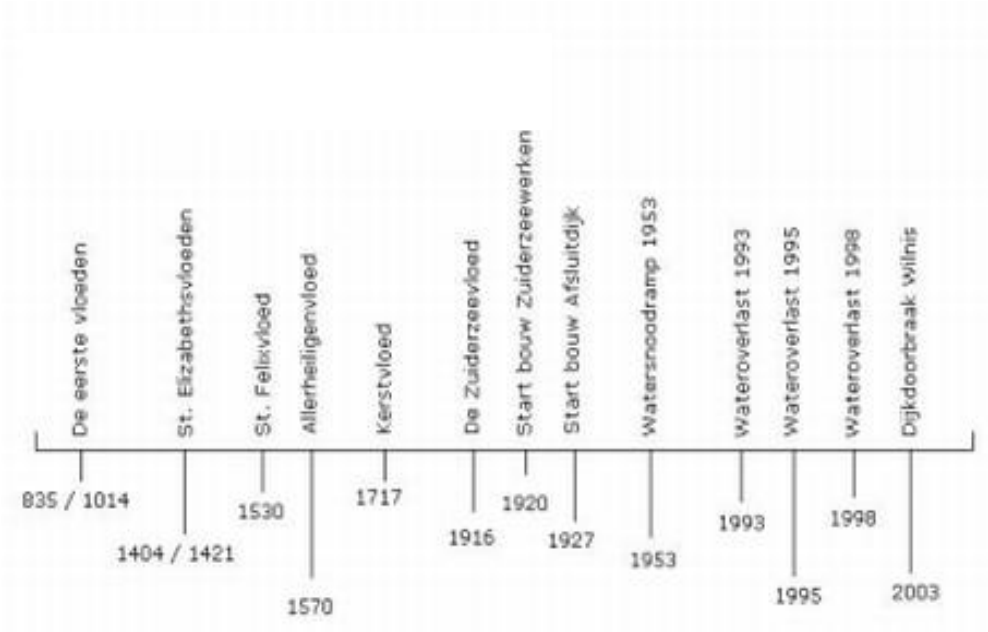


Figure 3**:** Water timeline of the Netherlands (www.waterland.net)

It has long been a habit of the Dutch people to let water run into the ocean as fast as possible. The proposed measures in the 'Room for the River' project entail a fundamental change in attitude towards water management in the Netherlands. Instead of fighting against the water, the paradigm is changed in living with water. This entails to give the water more space and to retain it longer in certain areas. This means a loss of land in this highly populated country. The history of fighting against water has much influence on how people feel about the proposed measures in the 'Room for the River' project. A fundamental change in attitude is not likely to happen overnight.

Another aspect to take into account is the possible endangerment of cultural historic element in the landscape by the measures proposed in the 'Room for the River' project. Many people find conservation of these elements very important (Klaveren and Oostdijk 2002, pp 49).

4.3.2 Safety and risk aspects

Several aspects can influence the experience of safety from raising waterlevels. Research by Klaveren and Oostdijk (2002) found that especially the placement of the house on a safe position is important for the feeling of safety. Information, for example about water levels and the action of government in times of crisis, can contribute to a feeling of safety. Especially area specific information appears to be appreciated by inhabitants. Dikes can also increase this feeling of safety.

There are also some aspects that decrease the feeling of safety experiences by inhabitants, for example misleading or unclear information.

When Dutch people are asked how they think the Netherlands should protect itself againt rasising water levels, they respond that a combination of measures should be executided. The major supports the heightening, enlarging and mainting of dikes. A minor group supports the creation of retention areas, emergency runoff and reservoirs as solutions for the problem. Some people name the reform of the traditional water division and several people mention giving room to nature and using nature in protection as options. In the empirical research of Broekhoven et al. (2006) peoples values with respect on how The Netherlands should protect itself in the scope of policy concept of "Space for Water" were investigated.

4.3.3 Religious values

Water plays a large role in major religions around the world as a sacred gift of God. Religious interpretations and rules governing about ethically adequate use of water can influence water management, especially in regions were religion plays a large role in daily life.

4.3.4 Experience of nature

In the new paradigm, living with water and the experience of nature are important issues. In the 'Room for the River'project opportunities are seen in the new river management system for an enhanced relationship between people and nature. The question is what the experience of people of nature in concrete projects is.

An important question is: What is meant by experience of nature? To clarify the term experience of nature a simplified model of the relationship of human with its environment developed by Buijs et.al (2004) is used.

It should be taken into account that this model is highly simplified; many aspects are influencing every step of the model. For instance, perception of the physical environment is influenced by the already existent images and goals.

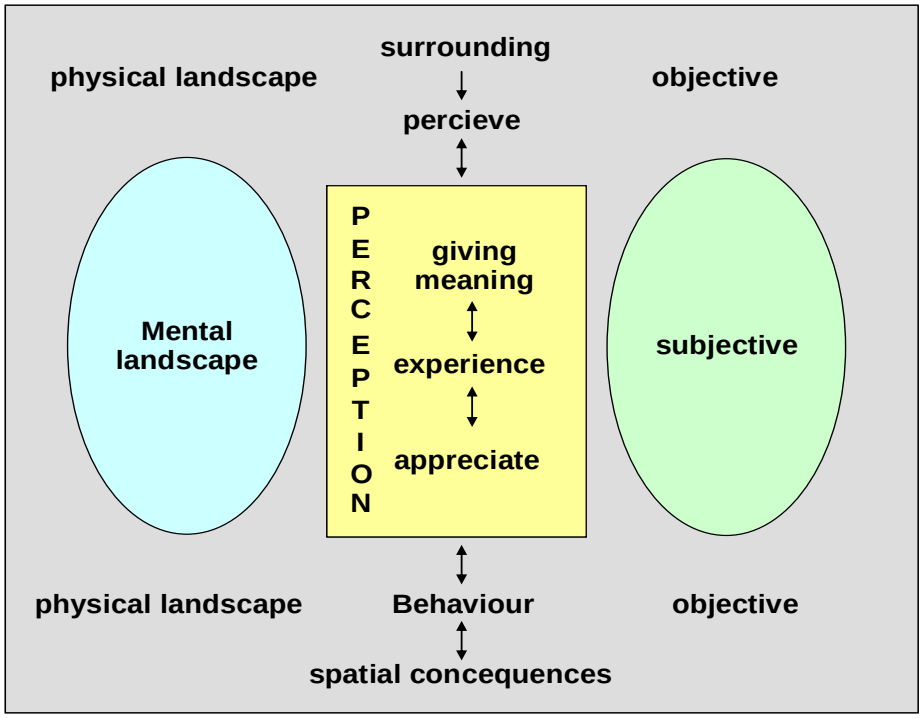


Figure 4**:** Experience of landscape (Gevoelsrendement van natuurontwikkeling langs de rivieren. (Alterra, 2004)

4.3.5 Combining water and nature development

As mentioned in the previous section, opportunities are seen in the new river management system for an enhanced relationship between people and nature. The research of Broekhoven, van et al. (2006) explores the relation between river management, nature and people's experience. The also investigated how people value this relation in general sense. Two case studies proceed on this exploration more in detail.

First of all it is important to look to the influence of water on the experience of nature. Van den Berg et al. (2002) found in their research on the experience of water types that the presence of surface water has a positive effect on the appreciation of nature and landscape. The survival function of water and the calming effect of it seem to be the base for this positive appreciation. Broekhoven, van et al. (2006) researched this calming effect of water more in depth in their section on stress relieving.

Secondly, it is important to see that the development of nature can have positive effects on appreciation by the public of the water system. Buijs et al. (2004) found that nature development can have positive effect on peoples feeling towards rivers. Rivers with nature development are seen as more attractive. However, the connection with the river of people living close by declines. In the research it was found the perception of the riversides is mostly dependant on the specific development and less on formal landscape type. The advice was to regard liveability in the development plan from the start and making this criterion for the design, so the resistance from people would be minemalized.

A combined development of nature and water seems to have positive effects on the experience of both nature and water systems. The positive influence of combining water and nature development on the experience of nature and the appreciation of water systems presents opportunities to improve the recreational value of the areas affected by measures of the 'Room for the River' project. This can increase the positive appreciation of the measures by the public and reduce resistance against these measures.

4.3.6 Experience of the proposed measures by the 'Room for the River' project

Klaveren and Oostdijk (2002) researched the experience of some of the proposed measures by the 'Room for the River' project. This section contains a short overview of the results found in their research. The results of the empirical research conducted by Broekhoven, van et al. (2006) and some findings from the research by Klaveren and Oostdijk can be found in chapter 5 of this paper.

The first result is on inner dike measures from the research of Klaveren and Oostdijk (2002). The measures retention, green river and large-scale dike replacement have been researched. Respondents expected measures toward a retention area would lead to a feeling of enclosement, as dikes will be built around villages. Thereby it was also expected that dikes would hinder the view. The green river is expected to possibly damage nature in the area. Large scale dike replacement is viewed as a threat to (monumental) buildings along the river. Because the bending dikes are an important part of the experience of the river landscape, respondent would not like the dikes to be made straight.

The second result is on the outer dike measures: lowering of the river foreland (Uiterwaard), removal of obstacles, lowing of the groynes and deepening of the summer-bed has all been researched by Klaveren and Oostdijk (2002). The respondents expect lowering of the river foreland will result in a bigger diversity of flora and fauna. Lowing of the groynes could,

according to some, also result in a enrichment of nature, while others fear it will lead to the opposite effect: an depletion of flora and fauna. The deepening of the summer-bed is not expected to have any influence on the experience of the area. The removal of obstacles could, according to some respondents, lead to a decline in variation in the area because of the disappearance of buildings, flora and fauna.

4.3.7 Intrinsic value of water systems

It is important to appreciate the value of water for humans both from an economic and from a socio-cultural point of view. But besides these anthropocentric values of water, water has a value of its own, separately from the value humans derive from it. This intrinsic value should also be taken into account in sustainable water management. Hooff, van and Klinken, van (2006) argue for a broadening of the well-known Brundtland definition of sustainable development: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs: there is enough for everyone's needs but not for everyone's greeds". Broadent with "Sustainability includes all life forms with which we share the planet independently from anthropocentric utility considerations." (Hooff, van and van Klinken (2006), p 40).

4.4 Macro-economic drivers: Benefits to society

Three focus points for integrating water management into regional planning generate crucial economic drivers of new water management approaches at a macro level. These three focus points are: water quantity, water quality and erosion control.

The first focus point, *water quantity*, relates directly to safety. New water management approaches can prevent and/or mitigate large-scale floods. New water management approaches are often seen as a more cost-effective tool in flood prevention in the long run. This is because they are based and robust interventions on the scale of the complete water system. In Europe, flood prevention has been a key driver in providing more room for the river, as obvious examples in both the Rhine and Meuse rivers show. Also on a world wide level safety has been an important macro-economic driver of alternative water management approaches. A good example is the Lake Dongting project in China. Lake Dongting is situated in the Yangtze basin and is one of China's largest freshwater lakes. It serves as a crucial buffer for storing freshwater and reducing flood disasters. Hover, fifty years of intensive land reclamation (the building of dams, dikes and polders) in flood plains and lakes for agriculture and urban settlements have severly affected the Lake, resulting in habitat fragmentation and the disruption of natural processes. The devastating floods of 1998 in the Yangtze and Yellow rivers areas demonstrated the urgency of doing something about this. In 1999, WWF together with partner organisations launched a process to restore and sustainably manage Lake Dongting and its wetlands. Up to date, 100 hectares of wetlands have been restored through the removal of dikes, which has decreased the risk of flood to families as well as increasing their incomes from rising fish catch.

The second macro-economic focus point is *water quality*, which for a large part refers to improved quality of drinking water for towns and cities. A good example where this has been a key driver for alternative water management approaches is in New York City. Nine years ago, the city launched a project to protect its drinking water by improved management of its watershed. This watershed, called the Catskills, provides drinking water daily to 9 million New Yorkers. A new filtration plant large enough to clean the city's water supply would cost

approximately $6 billion to build and another $250 million annually to maintain. Preserving the watershed, conversely, was estimated at $1.5 billion, just over a dime invested on ecological preservation for every dollar that would have been spent on a filtration plant. Therefore, in 1997 New York City started buying up thousands of acres of land in the Catskills, shield its reservoirs from pollution and subsidize environmentally sound economic development. This process and its achievements has had the result that more than 140 other cities in the US are now also considering watershed conservation as opposed to building filtration plants.

A third important focus point of alternative water management approaches is *erosion control*, especially of landslides and sedimentation of rivers. A good example is China's 'Grain for Green' Program, a forest restoration program that aims to replant forest and grassland on agricultural lands in the Yangtze and Yellow river basins. Excessive logging of natural forests for farmland on hillsides of the upper reaches of the Yangtze River are responsible for decreased forest land, reduced water reserve capacity, increased water and soil erosion, increased siltation and constant floods. Present records show the annual land loss in the Yangtze and Yellow river areas to be as high as 4 billion tons. This is largely due to deforestation and the cultivation of hillside agricultural lands, which contributes to two-thirds of the annual sand flow into the Yangtze and Yellow rivers. China's policy to convert steep cultivated land to forests and grassland began implementation in March 2000. The plan involved more than 13 million hectares of farmlands and 6 million hectares of which are steep sloping farmlands of over 25 degrees.

4.5 Financial drivers: Benefits to individual stakeholders

A number of economic drivers of new water management approaches can be distinguished that accrue as gains to individual stakeholders, the so-called micro level. These gains can be a reduction in costs or an increase in benefits related to water quantity, water quality and erosion control. The way in which the functions of a water system are managed generates opportunities for industries (clay mining and sand extraction, brick making, processing of food and beverages), housing, recreation and tourism.

The first economic driver is the availability or *quantity* of water to individual stakeholders, such as dams and bottling companies dependent on a regular river water flow. A good example is the case of the Jequetepeque river basin in Peru, where the Gallito Ciego dam and its beneficiaries are exploring alternative river basin management approaches in the upper watershed. The water flow to the dam, which is both for hydropower and irrigation purposes, has decreased significantly over time, for a large part as a result of unsustainable management of the catchments. The dam and its downstream stakeholders have embarked on a process to compensate upstream communities for giving up their unsustainable land-use practices, including agricultural practices and logging and diversify their activities towards more sustainable ones that will ensure the dam of a more regular and sustainable flow of river water. Another good example is the Sierra de las Minas watershed in Guatemala. Due to unsustainable upland land use and over-exploitation of freshwater resources by bottling companies of Coca Cola and LISAZA, Guatemala's biggest rum company, water flow has significantly decreased over time. The bottling companies are now putting money into a water fund that will go towards the sustainable management and protection of the catchments, and systems of payments for environmental services to upstream local communities for improved catchments management are currently being explored.

A second important economic driver of new water management approaches is the improved *quality* of freshwater as a production input to individual stakeholders, such as bottling companies. Bottling companies have typically exploited water resources and moved on to the next one as soon as water quality deteriorated. However, some companies have realized that the protection of water resources is more cost-effective than building filtration plants or moving on to new sources. A classic example is the case of Perrier Vittel in France, the worlds' largest bottler of mineral water. It designed a program to improve water quality by reducing nitrates and pesticide and restoring natural water purification in a sub-basin of the Rine-Meuse watershed in Northeastern France. A large part of the program focuses on working with farmers to improve their farming activities in the watershed, as well as watershed reforestation. For example, Vittel has purchased agricultural land around Vittel springs, compensated farmers to switch to less intensive dairy farming technology and pasture management.

Erosion control to private stakeholders can be a third important economic driver for new water management approaches. Deforestation and unsustainable land use in catchments and along river banks can result in high levels of soil erosion, where mud and soil ends up in the rivers, leading to the siltation of rivers. As a result, private stakeholders, such as hydro-electric companies and bottling companies but also the shipping industry will need to invest large sums of money to either de-silt the river water before they can use it as a production input in the case of bottling companies and dams, or to dig out the river beds for better use of the river as a transportation system in the case of the shipping industry. Increasingly, however, these private entities are looking towards improved river basin management as a more cost-effective approach. An interesting example is a Coca Cola bottling company in Dar-es-Salaam in Tanzania. The catchment forests for the Ruvu river in the Uluguru Mountains have disappeared at a very high rate from 30,000 hectares in the 1950s to 20,000 hectares left today. These forests can no longer protect the river banks from eroding and increasingly rivers are silting. The bottling company is currently exploring ways to improve upstream catchment management that will decrease siltation levels in their production processes.

Other important financial drivers for alternative water management approaches are clay mining, recreation and tourism, housing and sand extraction. The Gelderse Poort is a good example for these drivers. Located at the top of the Rhine delta in the Netherlands, this area has been heavily affected by humans since the Roman times. The river was canalized, wetlands drained and river plains were very intensively used. However, especially since the exceptionally high floods in 1993 and 1995 awareness that floodplain capacities are crucial for dealing with peak floods in particular increased and with it the realisation that something needed to be done about this in the Rhine delta. The Gelderse Poort area received more room for river flows and nature development and river forelands were reconstructed to increase the discharge capacity of the river Rhine, while river forests and swamps have returned and with them numerous plants and animals.

Clay mining and brick factories are some of the oldest industries along rivers, where traditionally top layers of alluvial clay were excavated from parcels of farm land in the river flood plains for brick making, which were then left behind to return to agricultural use. In the Gelderse Poort, clay mining was adapted and used as an instrument in the new water management approach. Clay mining now takes place superficially over larger areas to restore historical river courses and improve biodiversity and water retention. As a result, the brick and clay mining industries obtain a better image, while water retention is improved.

The increased nature in the Gelderse Poort has also triggered a significant increase in visitors and *tourists* to the area. At present, hundreds of thousands of people visit the area annually to walk

and relax in nature. As a consequence, restaurants, hotels and cafes have opened, resulting in a substantial growth of jobs in tourism, recreation and hospitality. Furthermore, the Gelderse Poort has attracted a lot of wealthy urban people who have chosen to buy houses in the area. As a result, the *housing industry* has boomed. The price of houses in the Gelderse Poort have doubled and in some places even tripled.

The area around the Gelderse Poort has also been a very suitable area for *sand extraction*, used as a basic material for construction and infrastructure. The sand extraction industry, however, has received substantial criticism due to its environmental and ecological impacts and its future was under threat. However, similar to the clay and brick making industry, sand extraction in the Gelderse Poort was used to build new riverine landscapes in which ecological processes are restored. A number of initiatives are currently underway in which not only sand extraction can continue in a sustainable way, but its industry also receives an opportunity to improve its image by contributing to new nature and improved water storage.

5. Economic Drivers for ‘Room for the River’ in practice

5.1 Introduction

The previous section outlined the various economic drivers of new water management approaches, in which it distinguished macro-economic drivers from society and financial drivers and individual stakeholders. Table 2 on page 18 summarizes these drivers. This section is built on the discussion to identify the key drivers directly applicable to ‘Room for the River’ in Western Europe.

As was explained the ‘Room for the River’ policy paradigm aims to give more space to rivers to drain peak flows. The first economic driver is water quantity. More specifically, this driver exists primarily at a macro-economic level, namely the safety for society. The government has historically attributed the responsibility for this important task.

The question is whether it is possible to look beyond the obvious macro-economic driver of safety and to explore whether this can be linked to other possible economic drivers. This is particularly important in light of financing ‘Room for the River’ projects, where it will be crucial to extend the economic benefits of ‘Room for the River’ to as many stakeholders as possible to derive a positive benefit-cost outcome. The “bundling” of benefits will increase the reasons for and the acceptance of ‘Room for the River’ by the different stakeholders. Traditionally, financing ‘Room for the River’ has been covered by the public sector (government), as the environment and the restoration of its services has been viewed as a benefit to society as a whole, while being viewed as a positive externality by private stakeholders. However, the previous section highlights a significant number of cases where private stakeholders have recognized the financial benefits from alternative water management approaches and the question is whether such financial benefits can also be derived from ‘Room from the River’. The question then becomes: are the economic drivers of alternative water management approaches, as identified in table 2, applicable as economic drivers to ‘Room for the River’?

To answer this question it is first important that water quantity benefits of ‘Room for the River’ exist not only at a macro level, but also at a micro level. Specific private stakeholders or companies dependent on water as a production input, such as hydroelectricity companies and bottling companies, receive a direct financial benefit through a more stable water quantity.

Secondly it is important that water quantity benefits at a macro and micro level is at the same time compounded by water quality and erosion control benefits. Can more ‘Room for the River’ be constructed in such a way that safety is guaranteed and that quality of water is improved and/or erosion will be decreased? At a macro-economic level, entire cities and towns may benefit from improved drinking water and harbors may benefit from decreased erosion. At micro-economic level stakeholders like bottling companies, may benefit financially from improved water quality, while the shipping industry may benefit financially from decreased siltation of riverbeds.

In addition to these stakeholders, other private stakeholders can potentially be found that benefit financially from more ‘Room for the River’ and therefore may constitute important economic

drivers. The example given in paragraph 4.5 of the Gelderse Poort in the Netherlands, where the clay mining and sand extraction industries, housing and tourism industries all benefited financially from more 'Room for the River' indicates that this is a realistic possibility.

In conclusion, when looking beyond the traditional beneficiaries of 'Room for the River', a wide range of economic drivers can be identified. Needless to say, the applicability of each driver depends upon the context and stakeholders of the river and a range of other factors. However, in many cases such "out of the box" thinking is necessary in order to justify 'Room for the River' measures to its wide range of stakeholders. The next question is how these economic drivers can be turned into cash flows that finance the 'Room for the River' measures.

An empirical research was done by **WIE??** . In favour of the research both an internet survey and face-to-face interviews, were done in Nijmegen/Lent, because this area is directly influenced by the 'Room for the River' measures. Furthermore a population from different parts of The Netherlands is covered (both closer and further away from the main rivers) and with different personal characteristics that can give an indication of the way people perceive the measures. The valuation of specific measures in their specific contexts is illustrated in two case studies **(**sections 7 and 8).

5.2 Valuation of measures: results of a survey

The survey started with the open question to the respondent if they could think of a best way to protect the Netherlands from raising water levels. Two answers dominated. The major of the respondents thought that dikes were the best way to protect the Netherlands against high water, in the sense that these dikes could be heightened, reinforced or that more dikes could be made. The other answer that was given often (but far less that dikes) was to give the river more space to flow freely and take its natural course. A part of the respondents answered that the water was manipulated long enough and that, because of the fact that more water would come, dikes would not be enough.

For the implementation of practical 'Room for the River'measures, the perception of the people involved, about the different measures, is of importance. This perception depends highly on the valuation of the public and professionals. In order to get some insight, people in the survey were asked to qualify and rank four different measures: three of these measures (room for the river, retention basin and moving of the river to make high water ditches) are mentioned in the 'Room for the River' project and one (dike heightening) is an already existing measure. The qualification of the measures took place by the respondents designating good and bad qualities to the measures. The measures were ranked in the most preferred order.
The result of the ranking was: first the 'Room for the River' measure giving land back to the river, then dike raising, followed by moving the river creating high water ditches and the last one was the creation of retention zones. Very interesting here is that before the introduction of the four measures people identified dikes and dike heightening as the best method, after the introduction making 'Room for the River' was by far the most preferred measure.

To make the comparison between the measures more clear, the different possible positive and negative aspects of the measures of the respondents were listed in five main categories: risk, economics, nature, cultural and social issues and spatial issues. An example to clarify this last

part: Within the risk category there is the question whether or not the seriousness of floods would increase or decrease. Positive for a measure of course would be that the seriousness would decrease and negative would be that the seriousness would increase.
Figures 5 till 8 show the result of the four measures and the five catergories. The figures give an indication of specific aspects that are identified for the specific measures. The aspect where all the measures score relatively high is the reduction of risk (be it the number of floods, the severity of the flood and/or the preparation for impacts of global warming). With just a minor difference the ‘Room for the River’ measure scores highest. About the same score is for the dike heightening measure, for which people generally do not see the direct threat. What is interesting to see and which is not shown in the overall figure, is the difference between short-term and long-term risks of dike heightening. The respondents do not see the danger of higher dikes on the short term, but on the long term a large part of them do acknowledge that dike heightening is not a very good option for countering effects of global warming. This difference is shown in figure 9.
Relative to dike heightening, the ‘Room for the River’ measure is seen as the best option to counter effects of global warming. The other two measures score lower on this aspect. The main economics impact of all the measures is that it is very costly, where the creation of high water ditches is seen as most costly and creating retention zones as least costly. Positive aspects were mainly a higher number of jobs with dike heightening and retention zones (possibly through tourism).
Interesting is also to see that on the nature aspects (more nature and water quality) the ‘Room for the River’ measure is the only measure with more positive than negative effects. This can be mainly explaned by that the respondents think that more nature will be created due to more room for the river. Especially for the ‘Room for the River’ program this could be very interesting. Next to the economic factors, are also with the cultural and social factors (Dutch culture and Dutch landscape) more negative than positive aspects mentioned. This can possibly be due to the fact that in most of the measures more space needs to be given to areas that can possibly flood. Interesting to see is that people do think of dikes as Dutch culture, but not as a big impact on the Dutch landscape.

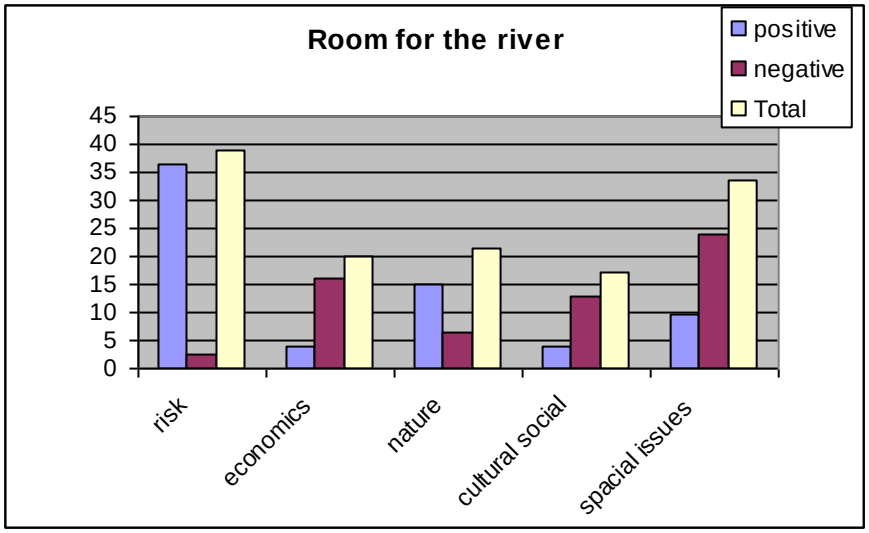


Figure 5**:** Positive and negative aspects for measure: Room for the River

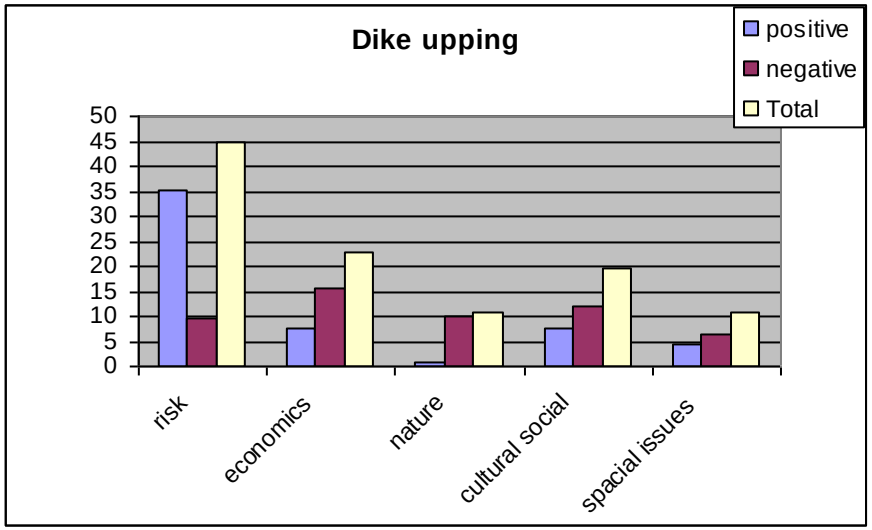


Figure 6**:** Positive and negative aspects for measure: Dike heightening

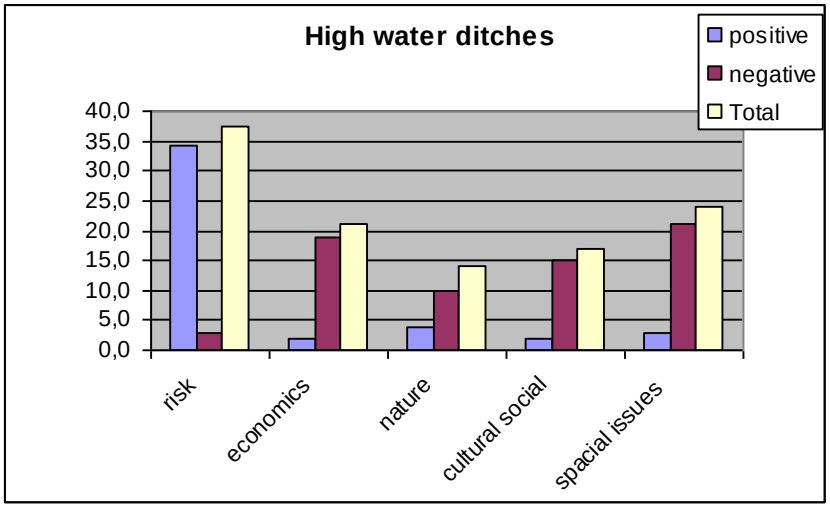


Figure 7**:** Positive and negative aspects for measure: creating high water ditches

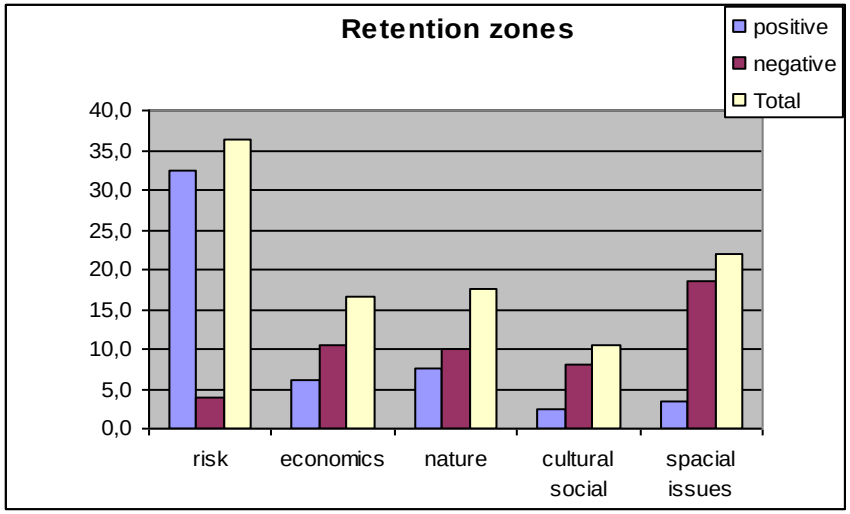


Figure 8**:** Positive and negative aspects for measure: creating retention zones

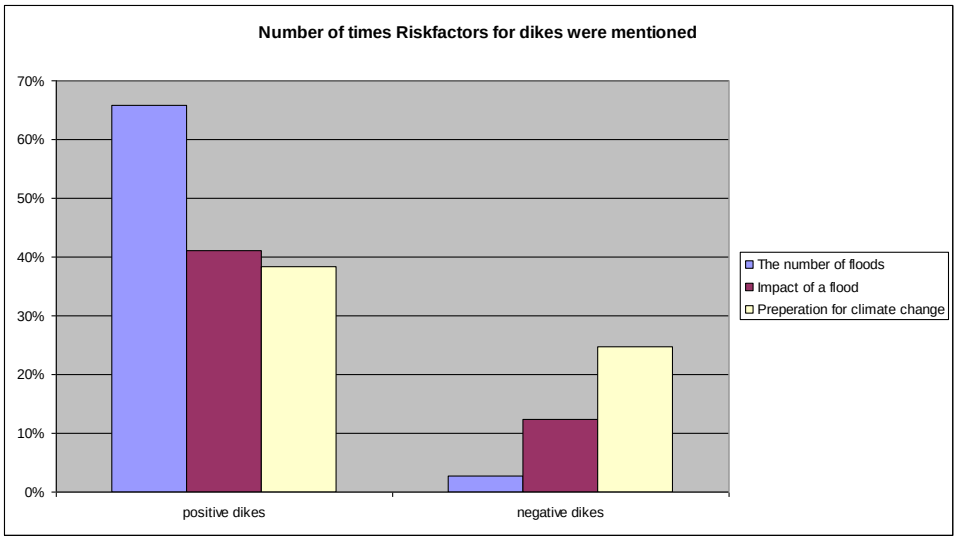


Figure 9**:** Risk factors of dike heightening

The impact that remains is the spatial issues. It is interesting to see that the respondednt are not aware of the fact that heightens of a dike goed together with broadning of the dike. Where for the other three measures the respondents do think that a lot of space needs to be sacrificed to give more space to the water. Also interesting is that the ‘Room for the River’ measure has the highest positive effect on this aspect, which is mainly due to the fact that the respondents assume that more recreational areas will arise due to this measure (this could also have been assigned to the economics group).

Now that the general data of our respondents is presented, it is interesting to see whether specific personal characteristics are important for the choice of most preferred measure. In the questionnaire were various personal questions submitted, specific for this grouping process. Very interesting is the fact that people who have actually experienced a flood or know somebody that has experienced a flood think very negatively of dikes and dike heightening. Where the dike heightening measure is scored second by people who have no experience, it is scored fourth by people who do have experience. People with experience probably have lost faith in this measure, because they have seen the ‘protective’ quality of dikes. This could be of importance due to the fact that the general public has little knowledge of actual dangers of dikes and dike heightening. This might not be coincidence, because probably the national government want the public and businesses to feel safe behind dikes. The experience factor is the most important for explaining differences in preffered measures.

The distance to the river does not directly influence the preference order of people, but there is a strong difference in the strength of this preference. The ‘Room for the River’ measure scores first in groups both close (within 5km) and further away from a river. However people close to the river have a stronger tendency to see the ‘Room for the River’ measure as positive. This is interesting because the people close to the river will be the ones that would be influenced by this measure.

Education is also a factorthat does not play a important role in the scoring of the measures. Nevertheless people with a higher education do have a higher tendency to score the ‘Room for the River’ measure as best. Next to that, this group also has a stronger tendency to see the negative aspects of dikes. However they do score this measure still as second best.

An important factor is whether people feel involved in making the policy on water management, both local and national. From this survey it can be concluded that people do not feel involved, and about one third actually wants to be more involved. One thing that can be concluded from the face-to-face interviews in Nijmegen/Lent is the high distrust in the wateragency of the Netherlands (Rijkswaterstaat). In many interviews the wateragency was seen as a self-sustaining, bureaucratic organisation that gives out orders without really listening to the people who will be influenced. With one of the aims of the ‘Room for the River’ project being to involve the public more, this is something that could be improved with priority.

5.3 Risks and effects associated with ‘Room for the River’ measures

Acceptable risk levels for the dike ring along the Rhine branches are translated into a norm of 1 flood in 1,250 years (and 1:10,000 for the Randstad). These norms are differentiated in practice due to the state of the dikes as well as the level of economic and financial damages. The wateragency of the Netherlands mentioned that there is an ongoing agreement on policies to keep the risk of flooding, with the formula “chance x damage”, below 1:1,250. However, the risk regarding the emergency retention area is not taken into account. In fact, no decision is made on this owing to the rebuff of public acceptance. The effects from the measures given by well informed (“so-called “knowledged“) people of different organisations are shown in table 4.

Measures	Benefits	Costs
1. Physical-technical		
1. 1 Dike relocation	- water has more space - increases safety - naturally and effectively reduces water level: creates lower peak-levels - flexible for future - offer opportunities for new developments, especially combination of water functions with nature development, recreation, and living	- people may have to move - old houses have to be demolished. - being a threat for agriculture - land use limit and opposition (social & political pressure)
1.2 Improving existing channel		
- enlarging existing channel	- creates lower peak-levels - offer opportunities for new developments, especially combination of water functions with nature development, recreation, and living - no effect on the area within the dikes	- difficult because rivers are used for shipping and it is easier to find solutions just outside this mainstream
- deepening existing channel	- naturally and effectively reduces water level: creates lower peak-levels - offer opportunities for new developments, especially combination of water functions with nature development, recreation, and living - no effect on the area within the dikes	Not applicable
- creating side channel	- water has more space	- increase piping and water intrusion is accelerated
- smoothening the floodplain, including the reduction of people, industry, and forest in the floodplain	- water has more space - creates lower peak-levels - no effect on the area within the dikes - easy to get agreement - allow better use of floodplain area	- expensive, not create new area for water - difficult because rivers are embedded in rocks and used for shipping and it is easier to find solutions just outside this mainstream - people have to move

Measures	Benefits	Costs
- creating secondary river channels in the river foreland	- naturally and effectively reduces water level: creates lower peak-levels - offer opportunities for new developments, especially combination of water functions with nature development, recreation, and living - no effect on the area within the dikes	Not applicable
- creating high-water channel outside the river fore land (within the dikes)	- naturally and effectively reduces water level: creates lower peak-levels - offer opportunities for new developments, especially combination of water functions with nature development, recreation, and living	- often becomes a threat for agriculture
1.3 Creating retention area	- concentrate in one spot - increases safety - effectively reduces water level: - creates lower peak-levels - inexpensive	- difficult because of current land use and population (resulting in the acceptance and political pressure to use other measures instead) - uncertain for their inhabitants/ users - more suitable for the upstream areas
1.4 Green river	- channel will only be in use when it is high water (water level is not known)	- very difficult to farm with high dikes - land is of no use - no public involvement during the design of the plan
1.5 Dike strengthening/ heightening	Not applicable	- only effects the dike situation - might destroy the original old dike landscape - should only be taken in combination with other room for river measures - not creating low water levels

Table 4**:** Effects from the measures given by knowledged people of different organisations

The 'Room for the River' measures can be divided into two parts: physical-technical and socio-economical ones. The first part includes (1) dike relocation (2) improving existing channel (3) creating retention area (4) green river and (5) dike strengthening and heightening. According to the opinions of the knowledged people, they have mainly the same opinion on the first four measures that they can provide positive effects on the safety and technical issues (i.e. they efficiently increase safety and reduce the water level).

5.4 Awareness

The Dutch public has been aware of their fight against flooding for over a millennium beginning with terps, mounds or hills on which the people made their homes. Todays' public is used to dikes that are more functional and have been developed over time. Heightening and strengthening dikes is not included in the 'Room for the River' project, but it is being used as a measure because of its history and social acceptance within the Netherlands. However, in the research it appeared that when those who are directly involved in making policy were asked about the public's' perspective concerning the measures that are available for making room for the river, the general consensus was that the public was not willing to accept new measures.
Concerning the 'Room for the River' programme, the public was only involved in a consultative manner (the traditional way). In the western part of Holland (downstream) there was much more public involvement in the first stages of the planning process. So that other stakeholders could come up with their ideas. This was not the case in the eastern side of Holland, the upstream part. There the ideas were fixed from the beginning. Afterwards, the provinces presented a regional advice with river plans in various provinces as an alternative for the technical measures that were decided on. For the various measures that would be taken, policymaking was depending on local decision-makers and how much room they intended to give to the public. Some municipalities' organized 'ateliers' so that the public could choose various alternatives. In general, the local council supported the public choice.

The question now becomes, does the public need to become more involved, and if so, then how? With respect to the process of valuation the aspects of measures of the policy concept 'Room for the River' public involvement seems inevitable to gain insight into the values they are attached to those aspects not currently valued by the market and presented in financial figures, such as market prices for houses that encompass the economic benefits for housing.
The valuation of safety is itself a process in which a number of valuation techniques may be used. For an overview see appendix 2 (Paper Bouma & Francois).

6. Institutions and economic drivers in Space for the River

6.1 Introduction

As has been stated before, economic drivers are embedded in an institutional surrounding, both on the macro and the micro level. Although in an indirect way, the macro-level drivers can create cash flows, for example for funding. Especially the micro-level drivers can be used for creating financial resources for 'Room for the River'. Considering this, institutional arrangements that are able to transform macro-drivers into micro-cashflows can be very useful. Earlier the institutional setting has been introduced as in figure 1 (same as figure 10 below).

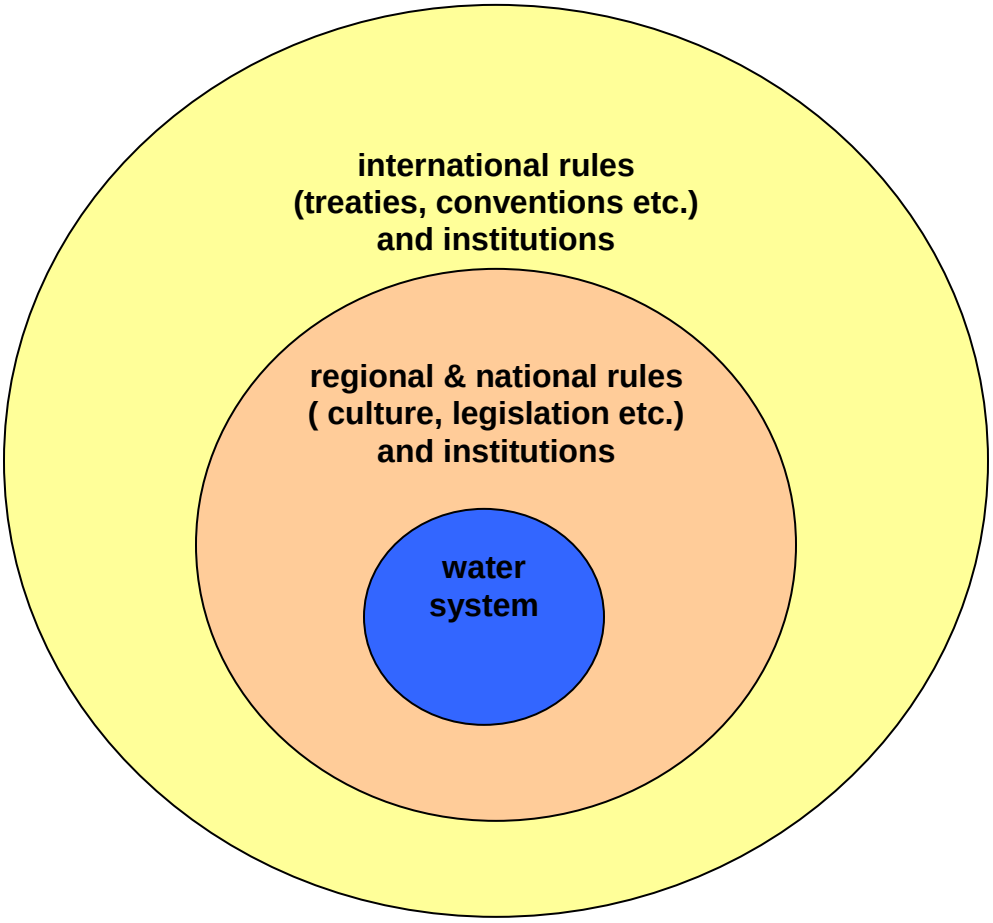


Figure 10: Institutional setting

1. Macro-economic drivers; **Economic gains related to:**	
Water quantity (inclusive ice)	- Prevention/mitigation of floods - Prevention of drought
Water quality	- Improved water quality for different functions like drinking water and agricultural water
Erosion control	- Control of land slides and sedimentation of rivers
Landscape beauty	- Beautification of the landscape/urban area with water bodies
Ecological value	- Improving nature development and increasing biodiversity
2. Micro-economic drivers: **Cash flows and value increase related to:**	
Industry: production water	- Water quantity: More availability of water to hydro-electric companies, industry, drinking water and bottling companies - Water quality: Improved quality of water as production input for industry,
Industry and electricity production: water for cooling	- Water quantity: Availability of water to hydroelectric companies and industry. - Water quality: Improved quality of water to insure cooling water input for industry and electricity generation
Hydropower production	- Water quantity with a reasonable quality to use as intake for generators
Drinking water and bottling companies	- Better water quality for less purification steps
Erosion control	- Less siltation of rivers increases availability of water as a production input to bottling companies and hydro-electric companies, and less siltation of the beds of rivers as transportation systems for the shipping industry
Clay mining, gravel extraction and brick factories	- Improved clay mining leading to improved water retention and improved corporate image of clay mining industry
Tourism and recreation	- Increase of nature-based tourism, recreation: sailing, rowing, hiking etc. and hospitality (hotels)
Fishing and hunting	- Increasing value of recreational fishing licences, water bird hunting rights
Housing industry	- Increase of housing prices in nature areas
Sand extraction	- Sustainable sand extraction leading to restoration of ecological process and improved corporate image
Products of nature	- Increasing use of wood, tree and reed stems, 'green' vegetables
Agriculture	- Increased availability of water for irrigation and watering in dry periods, water for drinking of cattle; sediments for soil improvement
Building	- Increasing availability of sediments for heightening of land for building
Transport	- Increasing space for shipping, pipes and cables

Table 5: Economic drivers have been introduced with the scheme as below

The following paragraphs consits of an exploration of institutional arrangements that enhance the use as cash flow of the identified economic drivers. The drivers at macro level are already mentioned in paragraph 4.4.

6.2 Micro level

Use of river functions

The value of water was illustrated by Middelkoop (1998). According to Middelkoop, in 1994 some 1280 million cubic meters of water were taken from the rivers in the Netherlands. Around 1200 million cubic meters of this water was used in industrial processes, mostly for cooling purposes.
By practicing ‘the user pays’, it is possible to put a levy on the intake of water from the river. With this money a fund for projects that improve the health of the river can be created. The institutions that have to be arranged consist of the government that collects the money and the law that enables this.

This institutional arrangement of levy can be imposed on different uses of the river system:
- Industry and electricity production: water for cooling
- Hydropower production
- Drinking water and bottling companies
- Clay mining, gravel extraction and brick factories
- Sand extraction
- Products of nature
- Extracting water for agricultural purposes.

Other types of uses of the river system are also suitable for the creation of funds, like the recreation sector. Tourists, fishermen and hunters have to pay a tax for their activities in many places. It would be relatively easy to arrange an institutional setting in which a small extra amount of money is imposed for river related activities.

Theoretically, the use of the river for transport (shipping) purposes could also be seen as users that should pay for river services. In practice it is perceived as not realistic to ask a contribution from the navigation sector for measures that are against their interests. Other types of economic drivers, like erosion control, are for other reasons not appropriate for the specific ‘Room for the River’ projects.

Housing industry and building

One of the most obvious economic drivers of ‘Room for the River’ is a housing project. Generally speaking, in Western European countries, selling the low valued agricultural land for a high price to housing project developer’s finances most land development. Specifically the combination of the desire of people to live near the water with the land

claims for broadening of rivers can result in innovative development of housing, in which the selling of houses could produce resources for the creation of room for the river.

6.3 Institutional constraints

Current institutional frameworks are generally spoken not devised for projects concerning the broadening of rivers or floodplains. This means that institutional limits can hinder the projects itself or the generation of resources for the projects. A clear example in Dutch water law (Rivierenwet) is the earlier mentioned prohibition of building in the floodplains. When for example houses could create cash flows for creating more space for the river, this water law prohibits building. In the Netherlands this problem has been admitted and recently some experiments have been facilitated by the minister of spatial planning (VROM) based on his competence to make specific local exceptions for general interest. It would be very well possible to use this ministerial competence for projects that allow the building of expensive houses in the floodplains in order to create funding for 'Room for the River' projects elsewhere.

With respect to the planning of housing projects the allowance of floating houses is another issue that illustrates the institutional constraints. Government did not develop rules for houses that float on rivers or lakes or that are flood resistant. This means that builders are not interested to start with this innovative type of building, since the outcome in terms of risks and benefits are not clear. Regulation is necessary on many different aspects, like:
- houses that fluctuate with groundwater level;
- waterproof isolation, windows, doors;
- the height of door-openings to resist flooding;
- safety measures
- sewer and drinking water connections
- surface of the water that maximally can be covered

Considering the more general aspects of project developers, it should be clear who is responsible for which elements of project development and who can be blamed when things go wrong. An important factor for success is the existence of a project owner. Especially when a charismatic person 'fights' for the realisation of his project ideas, the chances to realise the project are the highest.

Another example of institutional constraints is the prohibition to build on 'primary' (most important) dikes. This could frustrate housing development projects that are meant to create expensive houses with a good view on the river. Also the static position of the primary dikes are hindering creative planning. For example, the law that states that the dikes around Lake Veere (in he south of the Netherlands) are primary makes developments in the area of these dikes difficult. In the area with the Deltaworks new dikes and dams are created that take over the function of the lake Veere dikes, but the law from before the Deltaworks has never been changed. This type of hindrances also have a

cultural impact since they make people think that things can not be changed. The result is an absence of initiatives to change the situation, even when there are good reasons for.

6.4 Institutional arrangements

Step 3 of the *Capturing-Total Economic Value Framework*, the design of institutional arrangements, is focusing on the development of aspects like organisation, rules, means and policy instruments that stimulate the realisation of cash-flows. Various institutional aspects influence the amount of success of an initiative for a space-creating project. Some guidelines can help to identify the most suitable design. For the practical development of an institutional arrangement, in this case a Public Private Partnership (PPP), Kouwenhoven (1991) introduces four main phases: initiative, preparation, execution, and management/exploitation. Osborne (2000) divides the first phase in pre-contact-phase (weighing interests), the preliminary contact phase (exploration of institutional arrangements) and the negotiating phase (decisions about risks and benefits). He also points at the value of an evaluation phase in the end, in which the learning process has to be fed with information. Wolting (2000) proposes a time schedule in phases of attention in the development of a PPP from the perspective of a governmental institution. In the last, seventh, phase he uses nearly the same practical steps as Kouwenhoven (1991), but after the theoretical phases have been followed.

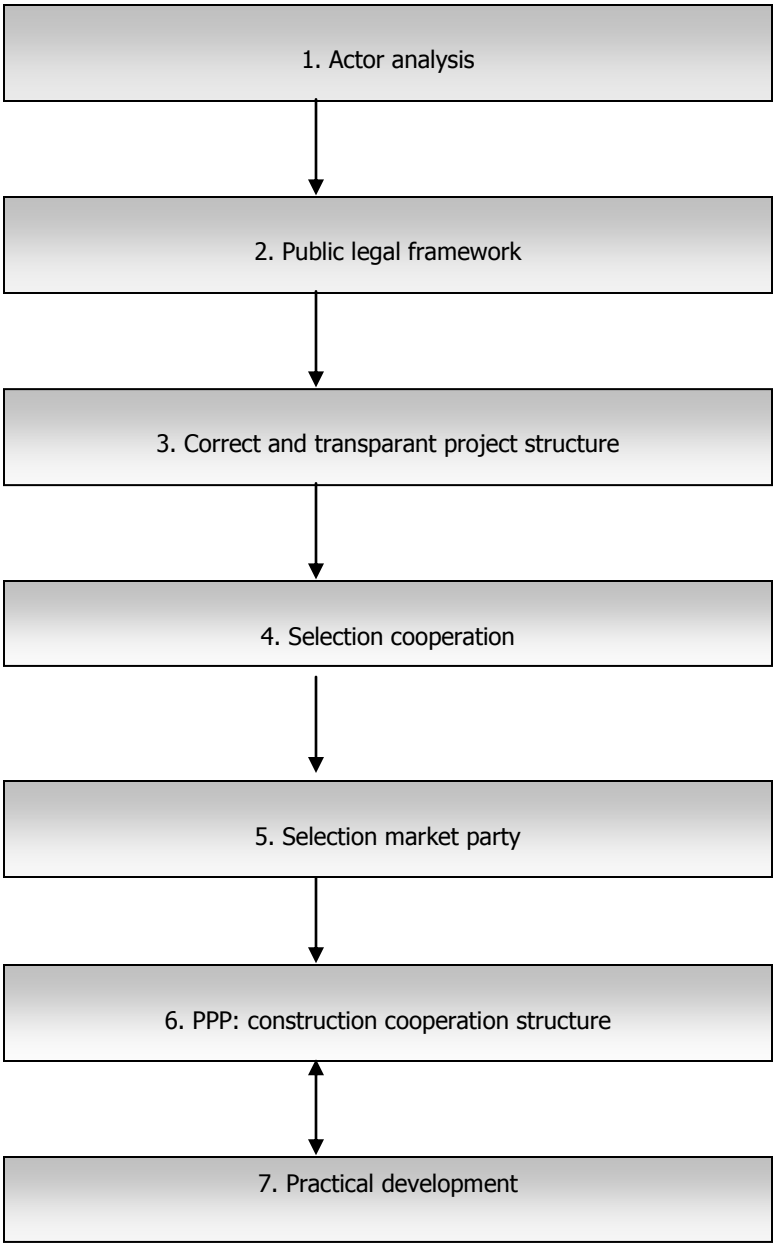


Figure 11: Development of appropriate institutional arrangements, based on *Wolting (2006)*

Figure 11 can be adapted to a general model for the identification of the most appropriate institutional arrangements. The adapted model can be used for a typical development project for housing in a broadened riverbed.

1. Actor analysis
Which actors are involved? Next to the municipality, the water management board and presumably the province or state, societal actors could be involved like inhabitants, nature and environmental organizations and eventually recreational and tourism organizations groups.

2. Public legal framework
Which regulation is applicable? Laws, rules and appointments about water management and land development are of utmost importance for the ability to realize the plans. An important factor for a project within the floodplains is the obligation to have a license. For the Netherlands, Atsma (2007) identified for a FAF/Symbiosis-connected project on a river island near Ewijk (Rhine) the following laws for which licenses are compelled.
- Law on management of state water works (Wet beheer Rijkswaterstaatswerken, Wbr), from the Ministry of Water management. This regulation considers especially the influence on the current patterns.
- Law on 'degrounding' (Ontgrondingenwet, Ow), consequences of large volumes of soil on the landscape from the Province.
- Law on Soil Protection (Wet Bodembescherming, Wbb). Building in any area means that the quality of the soil should be sufficient. For that reason the quality of the soil should first be investigated. If the quality is insufficient, measurements have to be taken to avoid damage.
- Law on Nature Protection (Natuurbeschermingswet) from the province and European Bird and Habitat Directives, but when main water flow is the purpose, the ministry is competent. The project should not go in against the regulation that was created to protect nature areas.
- Law on Flora and Fauna (Flora en Faunawet, FFw). When there are endangered species in the area, the project cannot be continued.
- Law on forest and trees (Boswet en Kapvergunning). When trees in the area should be cut, a licence of the municipality is necessary. When large quantities of trees are at stake an obligation of replanting can be sufficient.
- Law on Spatial Development (Bouw- of Aanlegvergunning) from the municipality based on the plan of spatial development (bestemmingsplan van de gemeente). For every building or work a licence can only be given when there it is not in contrast with the general spatial development plan.

When a large project is planned, an Environmental Impact Assessment should be done, based on the Law on the Environment (Wet Milieubeheer, Wm). The same law asks for permits in case the new activities have significant influence on the environment. Also the Treaty of Malta can have impact, when expectations are present about the possibility of archeological value in the pace. In these cases research has to be fulfilled before buildings can be realised in a site. When the sediments (clay, sand, gravel) are to be sold and used in other places, the Ministerial Directive on building material

(Bouwstoffenbesluit) is applicable. The ministry should give a licence for the use of the material.

3. Correct and transparent project structure
Before starting the project it is necessary to make a decision about the involvement of public and/or private actors.

Public management
Most of the mentioned governmental institutions are involved in the projects that are meant to give more space to the rivers. Since most of the rivers are part of the national water system, the Dutcj wateragency is involved as the main water managing body. The spatial planning is part of municipality jurisdiction, guided by provinces and national state.

The private sector
Depending on the type of economic driver, various private institutions, both companies, NGO's and organizations that consist of a combination of them can be involved in projects meant to create room for the river.

Mix of public and private partners
In cases of public and private interests of planning or projects it is very well possible to combine both elements in one institutional structure. Savas (2000) defines such a public private partnership (PPP) as a joint public-private arrangement that harnesses- more fully than conventional government arrangements do- the different strengths in the two sectors to provide public services and satisfy people's needs. In other words, PPP concerns a structured cooperation of governmental and civil actors, with their own identity an responsibility, aiming at the realization of a project, and based on a clear division of tasks and risks.

An important factor for good functioning of PPP is that involved partners have a common interest in the cooperation. For this reason it is very important that parties identify in advance the advantages of the establishment of the PPP. Combining public and private actors in project development has many advantages. For example the availability of knowledge, creativity, risk-limitation and a higher availability of resources. In many cases the advantages should be interpreted as the decrease of disadvantages: sharing of the risks. Smit & Thiel (2002) mention the advantage that governments obtain more feeling for the business side of the process, while companies get more understanding of quality and external effects of the project. If this decision has been made, it is possible to make explicit the total of the organization and structure of the project. This means in the first place that the project and its scope should be defined in a way that is clear for every involved actor. Conditions, advantages and disadvantages, possible profits and the roles of all parties are important aspects in this field.

4. Selection cooperation: distribution costs, risk and participation
The next step is the choice for a certain model of the cooperation. The formal agreement should contain at least the obligations, process architecture and the distribution of benefits and risks. When private partners are involved some other decisions have to made, since PPP can be divided in:
1. 'process-ppp'; where partners develop a common integrated plan.
2. 'project-ppp', where partners have a contract that results in an integrated product.

Furthermore there are different models of the contract; most common are the concession, the development organization and the alliance. They are introduced below.

Concession
Concession is a type of cooperation in which a government brings a long term right of exploitation on the market, against a certain amount of money. This 'contracting out' of public services refers to division of risks and tasks, formalized in the document of concession. Most of the times, governments get the ownership rights at the end of the exploitation as a compensation for their facilitating role; sometimes governments demand a certain share.

Development organisation
Mainly in city development, municipal and private actors together implement projects aiming at the revitalization of urban area's. The PPP here is a high level institution that stimulates and coordinates all kind of projects and initiatives to enhance economic and social conditions.

Alliance
In this model, the government plays an important role in the different phases of a project development or cooperation process. The alliance enables the parties to work together in a range of initiatives, projects, planning and implementation of shared goals.

When a model of cooperation has been selected it is important to formalize the agreement in a contract. In a juridical sense different types do exist. They can be found on a scale with on the one hand site short-term contracts for outsourcing and on the other hand side the selling of governmental rights to a private party. In between many different combinations can be found, like:
- Design-Build
- Design-Build-Finance-Maintenance
- Build-Operate-Transfer
- Build-Operate Own-Transfer.

The essential difference between these types of contracts and full privatization is that the government keeps its responsibility for the over all project.

5. Selection market party
When it is clear how the project should be developed, the individual market party can be selected. Depending on regulation for European tendering a certain selection mechanism should be made public first.

6. Construction cooperation structure
Together with the selected market partner a model of cooperation should be formalized by contract.

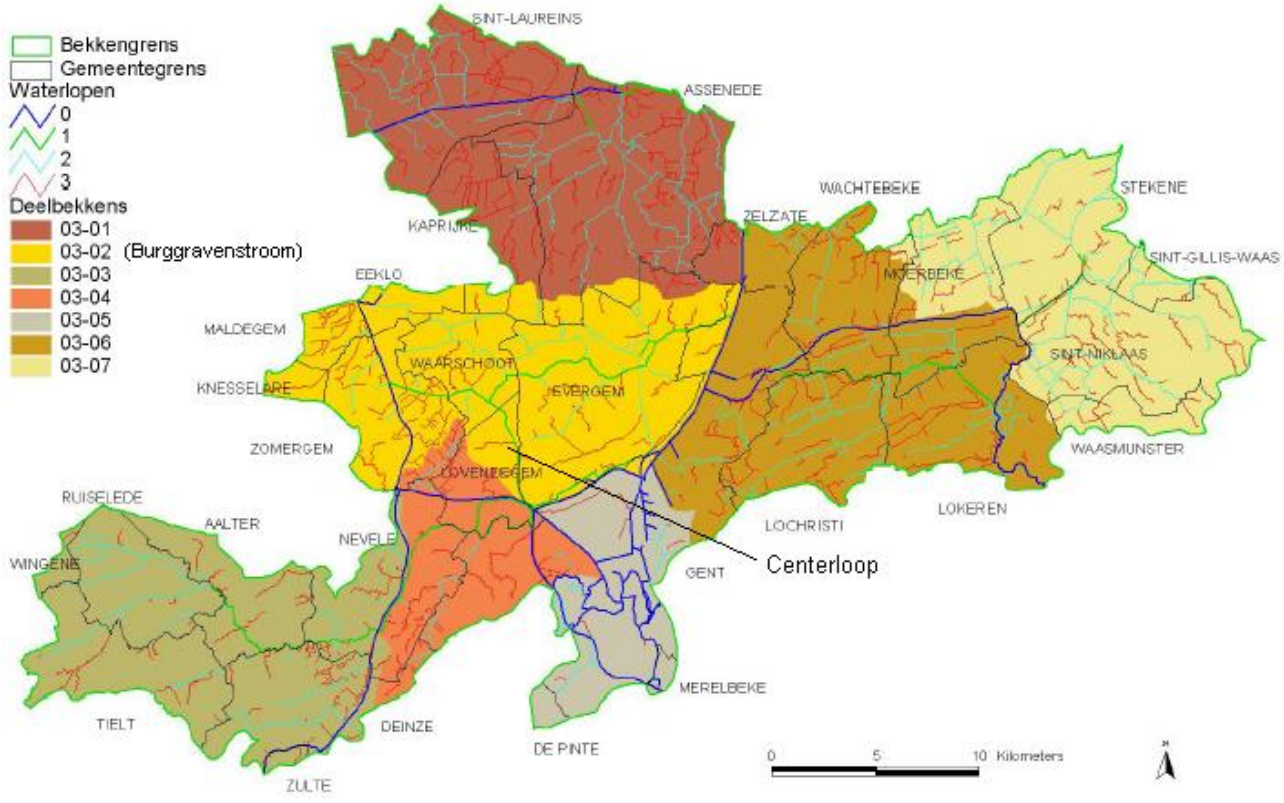
7. Practical development
The last phase of the development model consists in itself of four steps that all refer to the practical realisation of the project in the area: initiative, feasibility, realization and exploitation.

When these phases have been realized the conditions for a successful institutional arrangement are fulfilled. In the following chapter the models is illustrated in two case studies.

7. Case study 1, Centerloop

7.1 Introduction

The European Framework Directive on Water aims at a strong improvement of surface waters by 2015. The EU-member states have implemented Directive into their legislation. This is accomplished in the Flemish legislation by the Decree on Integrated Water policy. As a result management plans are developed that links the policy objectives with specific (non-binding) programmes of measures in order to achieve the overall goals contained in the European Framework Directive on Water. This case study focuses on the management plan for river "Burggravenstroom" and more specifically the Centerloop. This watercourse in Lovendem (Flanders) is presented in figure 12.



Figuur 12: Centerloop. (Source: Flemish Government, 2005)

In the case study the economic assessment of measures currently being implemented by the water authorities is confronted with an economic assessment of an alternative set of measures that is more in line with the 'Room for the River' concept. The alternative measures are presented to restore the Centerloop as watercourse, which would best resemble the state of one of its natural counterparts. The case shows that inclusion of benefits generated by improved conditions for agriculture and building development creates a net benefit to society (e.g. increase of Welfare). The possible factors for the exclusion of these benefits from the current economic assessments are presented and suggestions for improving the institutional context are discussed in order to increase the acceptance of these economic benefits as real cash drivers to increase the perceived feasibility of the alternative set of measures along with the promotion of the 'Room for the Rivers'concept.

The case is presented along with the steps of the Capturing- Total Economic Value Framework (C-TEV) as presented earlier. The case study shows that actual measures taken by the water authorize have higher societal costs than benefits. In contrast the natural restoration of the "Centerloop" would result in more societal benefits than costs. Changing the institutional context might prevent such outcomes of a policy-making process. A number of institutional arrangements that construct such a change are presented in paragraph 6.4.

7.2 Project design and inventarisation of relevant physical and ecological effects

The Centerloop is controlled by two governmental bodies.: the community of Lovendegem and the water board (watering) Burggravestroom. The community has planned measures with respect to the so-called management plan:
-a- *Controlling the environmental conditions of the landscape.* This results into measures related to the construction or reconstruction of ponds, maintenance of watersides and hedges. Also, other maintenance measures are part of the community plans which ensures the quality of the landscape along the river (cattle raising and agriculture).
-b- *Sanitation and the control of the quality of surface water*. The improvement of the current sanitation infrastructure and water purification equipment.

The measures related to A and B are further on referred to as project 1.

The relevant water board (*Watering Burggravestroom*) is obliged to clean up the current soil contamination in the Centerloop and a number of measures to control of flooding. Local flooding occurs as a result of rainfall. It is prevented by deepening the Centerloop in order to speed up the carry-off of water quantities in de Centerloop.

An alternative to the above presented measures by the Community Lovendem and the water board Burggravenstroom is to reshape the course of the Centerloop and to bring back the original setting of this course (referred to as project 2). To define the original circumstances of the river the European Water Framework Directive presents a typology.

It is considered as a small watercourse with a river basin of less than 50 km2. For this type a number of biological, hydro morphological and general physic-chemical quality characteristics are given. These values can be derived from a interpretation guideline of the European Directive (REFCOND, 2003). The so-called reference values are calculated by researchers and consultants are presented in scientific and gray literature (literature Leyssen A., 2006; Breine J., 2001; Stuckens J., 2005). An overview is presented by D'Haese (2007).

To bring back the original status of the Centerloop that complies to the reference values a number of measures are to be realized. However, the context of the Centerloop this river fulfils a number of functions that related to that are. The following can be identified:

- Function of drinking water capacity;
- Functions with respect to housing (landscape; prevention of flooding);
- Agriculture functions (prevention of flooding, provision of production water);
- Ecological functions (biological diversity, attractive water quality).

The alternative project 2 implies giving the course of the Centerloop more space (doubling its current width: 2 meters at each side of the river) and to facilitate the natural occurrence of the meanders. This means that ground needs to be claimed by the water board by means of compulsory purchase.

7.3 Project assessment and identification of relevant stakeholders

A societal perspective on the project appraisal can be framed into the use of a societal CBA. Table 1 and 2 presents the outcomes using different project lifetimes (50 and 100 years) and different discount rates (0 %, 2 %, 4 %, 6 % and 7 %). The costs of the measures is the total sum of measures provided by the local governments. The benefits are calculated on the basis of practical calculation rules provided by theory on environmental economics (Damage costs with respect to the value of flood prevention; Contingent Valuation Analysis with respect to the Existence value of the Centerloop; Hedonic pricing with respect to economic values of the houses in the area) and applied to the specific context of the Centerloop (D'Haese, N., 2007).

Project life time: 100 years	**0%**	**2%**	**4%**	**6%**	**7%**
Costs:					
a. Management plan costs	490,326.58	216,370.99	126,053.52	87,577.31	76,106.21
b. Sanitation measures	3137,496.06	2005,955,23	1603,745.53	1,409,768.12	1,344,606.06
c. Soil Clean-up costs	19,377.51	19,006,92	18,650.59	18,307.70	18,141.06
Total Costs	**3647200.15**	**2241333.14**	**1748449.64**	**1515653.13**	**1438853.33**
Benefits:					
a.Flood prevention	1,427,131.84	610,656.88	339,891.15	224,355,01	189,950.56
b. Existance value	366,867	161,275.90	93,496.78	64,622.15	56,013.61
c. Value increase of houses	0	0	0	0	0
Total Benefits	**1,793,998.84**	**771,932.78**	**433,387.93**	**288,977.16**	**245,964.17**
Net Present Value	**Minus 1,853,201.31**	**Minus 1,469,400.36**	**Minus 131,5061.71**	**Minus 1,226,675.97**	**Minus 1,192,889.16**

Table 6: A societal CBA for project 1 with a life time of 100 years (in Euro's of 2006).

Project life time: 100 years	**0%**	**2%**	**4%**	**6%**	**7%**
Costs:					
a.Management plan costs	245,896.58	158,156.37	110,685.10	83,143.22	73,655.55
b. Sanitation measures	2,182,916.06	1,779,844.68	1,544,435.00	1,392,765.21	1335,236.68
c. Soil Clean-up costs	19,377.51	19,006,92	18,650.59	18,307.70	18,141.06
Total Costs	**2,448,190.15**	**1,957,007.97**	**1,673,770.69**	**1494,216.13**	**1427,033.29**
Benefits:					
a.Flood prevention	701,565.92	436,822.40	293,801,58	211,020.04	182,573.70
b. Existence value	183,433.50	117,588.50	81,963.49	61,294.57	54,174.51
c. Value increase of houses	0	0	0	0	0
Total Benefits	**884,999.42**	**554,410.90**	**375,765.07**	**272,314.61**	**236,748.21**
Net Present Value	**Minus 1,563,190.73**	**Minus 1,402,597.07**	**Minus 1,298,005.62**	**Minus 1,221,901.52**	**Minus 1,190,285.08**

Table 7: A societal CBA for project 1 with a life time of 50 years (in Euro's of 2006).

In contrast with project 1, project 2 generates a wealth increase. The results of a similar societal CBA for project 2 are presented in table 3 and 4.

Project life time: 100 years	**0%**	**2%**	**4%**	**6%**	**7%**
Costs:					
a. Reconstruction water course	734,718.00	341,221.25	210,738.44	154,544.93	137,590.14
b. Sanitation measures	3137,496.06	2005,955,23	1,603,745.53	1,409,768.12	1,344,606.06
c. Soil Clean-up costs	19,377.51	19,006,92	18,650.59	18,307.70	18,141.06
Total Costs	**3,891,591.57**	**2,366,183.40**	**1,833,134.56**	**1,582,620.75**	**1,500,337.26**
Benefits:					
a.Flood prevention	1,451,131.84	634,189.37	362,979.91	247,022.15	212,414.71
b. Recreation and Existence value	751,615.00	330,412.35	191,550.58	132,393.97	114,757.32
c. Value increase of houses	2,896,800	2,896,800	2,896,800	2,896,800	2,896,800
Total Benefits	**5,099,546.84**	**3,861,401.72**	**3,451,330.49**	**3,276,216.12**	**3,223,972.03**
Net Present Value	**Plus 1,207,955,27**	**Plus 1,495,218.32**	**Plus 1,618,195.93**	**Plus 1,693,595.37**	**Plus 1,723,634.77**

Table 8: A societal CBA for project 2 with a life time of 100 years (in Euro's of 2006).

Project life time: 100 years	**0%**	**2%**	**4%**	**6%**	**7%**
Costs:					
a. Reconstruction of water course	384,718.00	257,863.57	188,732.35	148,195.74	134,081.04
b. Sanitation measures	2,182,916.06	1,779,844.68	1,544,435.00	1,392,765.21	1335,236.68
c. Soil Clean-up costs	19,377.51	19,006,92	18,650.59	18,307.70	18,141.06
Total Costs	**2,587,011.57**	**2,056,715.17**	**1,751,817.94**	**1,559,268.65**	**1,487,458.78**
Benefits:					
a. Flood prevention	725,565.92	460,354.88	316,890.34	233,687.19	205,037.84
b. Recreation and Existence value	375,807.50	240,908.23	167,921.85	125,576.62	110,989.47
c. Value increase of houses	2,896,800	2,896,800	2,896,800	2,896,800	2,896,800.00
Total Benefits	**3,998,173.42**	**3,598,063.11**	**3,381,612.19**	**3,256,063.81**	**3,212,827.31**
Net Present Value	**Plus 1,411,161.85**	**Plus 1,541,347.94**	**Plus 1,629,794.25**	**Plus 1,696,795.16**	**Plus 1,725,368.53**

Table 9: A societal CBA for project 2 with a life time of 50 years (in Euros of 2006).

The results of the societal CBA shows that project 2 generate a significant increase in societal welfare. Project 1 results even in a decrease of wealth. The main reason for this is that the potential benefits of improved sanitation are not accepted in this CBA framework. Stakeholders who benefit from improved sanitation are outside the system borders of the project appraisal. This is the case with down stream stakeholders (house owners, local communities and water boards) and the national government (compliance orientation of norms with respect to health and ecological quality). If these benefits would also be incorporated into the CBA the benefits of project 2 would increase with the same amount.

7.4 Institutional arrangements for the identification of economic gains and generation of cash flows

To come to the appropriate institutional embedding the earlier mentioned C- TEV model in 7 phases can be of help.

1. Actor analysis
Which actors are involved? With respect to the Centerloop, the municipality of Lovendegem and the water board (watering) Burggravestroom are the main actors, next to the inhabitants of the area.

2. Public legal framework
Which regulation is applicable? Most important is the objective of the municipality to restore the environmental conditions of the landscape and the community plans that ensures the quality of the landscape along the river (cattle raising and agriculture). This can be well combined with the obligation to improve the quality of surface water which brings improvement of the current sanitation infrastructure and water purification equipment. These public tasks are mostly the result of the European Water Framework Directive.

3. Correct and transparent project structure
The structure of this project mostly consist of public institutions (municipality and water board) which mean that the total of the organization and structure of the project are not extremely complicated. The source of finances is also mainly public.

4. Selection cooperation
The cooperation will be strictly within the governmental environment. This means that the next steps of the model (*5. Selection market party and 6. PPP*) are superfluous.

7. Practical development
The last phase of the development model is the considering of the practical development of the area (initiative, feasibility, realization and exploitation). This can be filled in with policy instruments like taxes and obligations. With such, the creation of cash flows from macro-economic values that hold implicit values can be enhanced, preferably with:

- Arrangements to transfer knowledge about the macro (welfare) and micro (cash flows) levels. Many gains of the "room for river" concept remain hidden and unknown to policy makers and individual stakeholders. By showing economic values of nature restoration the water managers can underpin their "room for rivers" concept;
- Creation of a tax system on property, like property tax and transfer tax;
- Wastewater tax based on cost recovery (polluter pays principle) from sewer users;
- Price setting of drinking water consumption based on cost recovery (user pays principle);
- Price setting of ground water extraction based on cost recovery (user pays principle);
- Compensation systems for realization of correct financial balance at decision-making institutions (municipalities and 'water rings').

7.5 Conclusions and recommendations for up scaling of the lessons learned

Some more general conclusions can be drawn from this case study:

- Increase the transparency in Costs and Benefits (Arrangements that for example create website at level of water board; see STOWA, www.mkbainderegio.nl)
- Mobilize a project developer for realization of housing and recreational values (facilitate and speed-up the process of permitting)
- Scan relevancy of recreational value increase and mobilize potential benefits (hotels, restaurants, etc.) through arrangements that communicate to these often unknown (potential) stakeholders of rivers.
- Mobilize stakeholders with positive side effects with respect to health and ecological values: involve national government and down stream stakeholders in public private partnerships (agriculture house owners, local communities and water boards, recreation sector). To identify these stakeholders a societal CBA can be performed with orientation on the total river basin.

In the following, a case-study of a different nature, in which a public private partnership is the intention is analyzed.

8. Case study 2, The Island of Brienenoord

8.1 Introduction

Within the concept 'Room for the River' are many different types of specific projects and measures developed. Within this case study a project is presented that combines different functions of an area within the riverbed.

The case is illustrated with the earlier presented 'Concept of Capturing-Total Economic Value Framework' (Chapter 3).

Tthe Capturing-Total Economic Value Framework

Step 1: Create a policy setting that links regional planning with river management (both water quantity and water quality control). Formulate a formal statement in which the multi-functionality of rivers is acknowledged. The link between regional planning and river management should be organized. The following questions may be raised to the relevant stakeholders of the policy process:

1. What are the physical, social and ecological effects of regional planning? To what extent represent these effects a change in the total economic value of the river and for who are these economic drivers relevant?
2. How can the total economic value be accounted for by the decision-makers?

Step 2: Identify and/or (co-)design cost effective projects that enhance the concept of space for the river (a multi-functional approach to rivers). As a result of the set of projects (construction of houses, dikes, etc.) the river performs its functions with its economic, social and ecological gains and losses.

Step 3: Design of institutional arrangements that should create drivers for stakeholders based on the generation of economic gains. Basically, four types of institutionalisation processes are promoted:

1. The establishment of an organisation that enables decision making processes (participation of stakeholders and regulated use of formal costs-benefit approaches, Public Private Partnerships);
2. The development of a clear policy wit a project plan to create space for the river;
3. The release of resources like cash flows, labour and machines;
4. The use of suitable policy instruments, if possible economic instruments like subsidies and levies, that go together with accounting practices at macro and micro level which enable interaction with stakeholders to be informed about the impact of the regional plans on their costs and benefits not necessarily in the form of a formal cost benefit analyses.

Through answering the questions in step 1, the gains and losses are identified and quantified in economic terms in the decision making process and decision-makers should decide on how these economic costs and benefits are to be integrated into the decision

making process. It is suggested that the total economic gains should be identified which may be accounted for in the decision-making process that proceeds to the implementation of the project or only some parts of the project. In practice the original plan may not be implemented but only parts of the project (eg. Specific measures) may be realized. This is in fact the case in the following case of the *Isle of Brienenoord*. It is assumed that project alternatives are assed and that only cost- effective alternatives will be implemented. This case study is followed up with an analysis of the institutional arrangements that embed the economic drivers in the decision-making project. The objective is to identify the separate costs and benefit items in a Cost-benefit framework with accounting rules and the integration of institutions in a public private partnership. The case is an analysis of a public private partnership which included investors and nature organization in the plan for development of the Isle of Brienenoord in Rotterdam. Although the project had a good start, different factors resulted in the collapse of the plan.

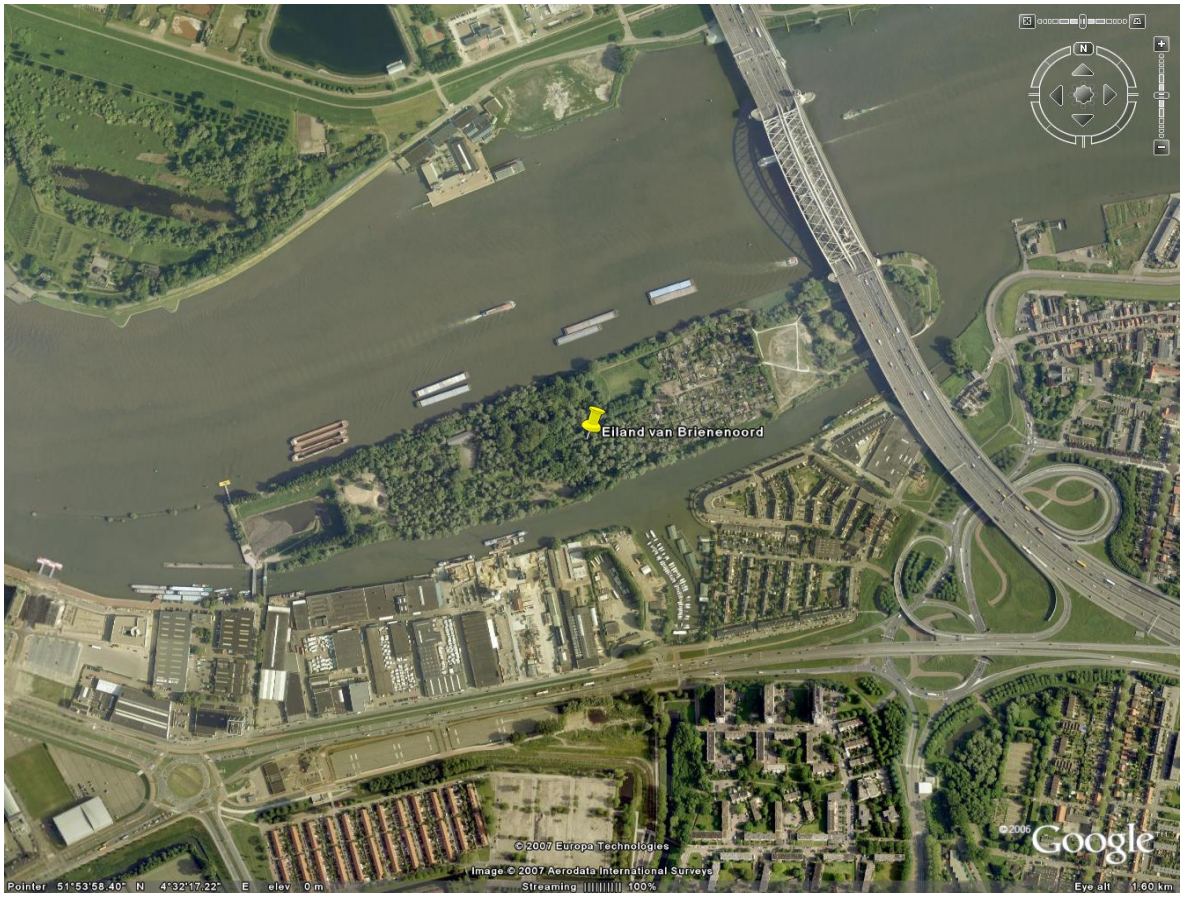


Figure 13: The area of Brienenoord

8.2 History and physical, social and ecological effects of regional planning

Originally the island was a sandy dune that came up in the river and was artificially heightened in the 19th century to become an island. The 21 hectare island was bought by the baron of Brienen in 1847, who started a salmon fishery on it. The main fish market, Kralingseveer, was just on the other side of the river. In 1880 was the peak of the Rhine salmon fishery with around 100.000 salmon traded in Kralingseveer alone.
The highest point of the island was built for the horses that were used for the fishing nets. In 1918 a machine factory was built, that bankrupted in the roaring thirties. Since than, the island was hired by two institutions that helped unhealthy people of the packed labour district in the south of Rotterdam. During the war, the Germans accepted small private gardens for food production that stayed ever since. On the east point the south pillar of the Van Brienenoord bridge has been built. This is also the place where natural processes resulted in a (small) marshy area with willows, reed and sandy beaches. Since 1989 most of the island is public space and an attractive object for urban planners.

8.3 Projectplan and measures

In 1998 WWF published a new view on the wetlands in the Rotterdam (WNF, 1998). The isle of Brienenoord is considered highly potential for nature development in the city. In 2000 the municipality signed an agreement (covenant) with WWF to develop an integrated plan for a combination of building and nature. At the east side, under and around the bridge pillar, a fresh water tidal system could be developed and be combined with recreation facilities. The area has already a function for nature education and educative hiking trips; since 2000 a 'wild' cattle is freely grazing the terrain. At the west side, near to the small connecting bridge, a hotel is planned.
Based on this covenant architect company Waardenburg draw a plan that was presented on 14 February 2002 in the community council (Boer e.a., 2002). One day earlier, on February 13th, WWF retreated from the covenant because, as it states, the plan leaves not enough space for nature and its further development. According to the plan a 180 rooms hotel complex with conference facilities and around 55 expensive apartments should be built on the west side of the isle (figure 14).

Figure 14: The masterplan, source: Waardenburg, 2002

Although the project (the *master plan*) was not realized in total, a number of separate measures were realized. In practice, discussions may arise what measures were generated in the scope of the master plan and what measures were initiated as a result of other initiatives. Still as long as they support the mission and realization of the *master plan* they may be considered. In this respect typical examples are to be listed in the area of infrastructures (roads, bridges, etc.) and nature development.

Some specific measures of the master plan are:

- Construction of a hotel and its facilities;
- Reconstruction of bridge;
- Quay (transportation of visitors and temporary stay of boats for the commercial transportation in front of the isle);
- "Nature friendly" bank (planting of willows, reed, …).

8.4 Institutional arrangements for the identification of economic gains and generation of cash flows

According to the presented development system for institutional arrangements, in the following the different elements can be filled in with the setting of the Island of Brienenoord.

1. Actor analysis
Within the scope of regional planning a number of stakeholders are identified. The history of regional planning shows that the set of relevant stakeholders changes over time. In this respect the current relevant stakeholders are:
- Nature organizations (nature development);
- Zuid-Hollands Landschap, ZHL (nature development and recreation);
- World Wide Fund for nature (nature development);
- Municipality of Rotterdam and sub municipality of Ijsselmonde (all gains and losses for the municipality);
- Project Developer (net financial gains of the project realization);
- Neighbors and house owners in the neighborhood (prices of houses and welfare losses/gains related to changes in the landscape);
- Commercial transportation freight ships. Depending on the final destination of the isle (hotel and recreation) this may hinder the temporary stay of commercial transportation freight ships with hazardous goods (economic losses);
- Future visitors and hotel guests (vacation and commercial guests with respect to business trips, trade fairs and conferences organized at the hotel).

Each stakeholder has his own stakes in the project and wants to increase its gains and decrease its losses.

2. Public legal framework
Local (bestemmingsplan), regional (streekplan) and national regulation (river regulation) are applicable. But since the island is planned to keep the same shape in the riverbed, the requirements by water- en river laws can be surpassed. The digging of naturally shaped tidal channels can have some influence on the management of the intensely used shipping canal that the Rhine (Nieuwe Maas) is on the site.
Important are further the Law on forest and trees as far as trees have to be removed. Especially the local spatial planning plan of the municipality of Rotterdam (sub-municipality IJsselmonde) is of influence, which is obliged by the Law on Spatial Development (Bouw- of Aanlegvergunning). For every building or work a licence can only be given when it is not in contrast with the general spatial development plan. The law on archaeological heritage (Wet op de archeologische monumentenzorg), based on the Treaty of Malta could have impact, in the sense that research has to be done to find out if there is any possibility of archaeological value in the place.

3. Correct and transparent project structure
In the process of the project the total of the organization and structure of the project has not been agreed in a transparent way. The project and its scope were not defined in a way that conditions, advantages and disadvantages, possible profits and the roles of all parties were clear for every involved actor.

4. Selection cooperation: distribution costs, risk and participation
This step, aiming at a certain model of cooperation has not been fulfilled in a proper way. The result is that a clear formal agreement containing obligations, process architecture and the distribution of benefits and risks has not been arranged. With respect to the order of the process the type of cooperation would be chosen after the market party was already

in the process. This means that the selected market party was not the result of a rational selection of the most appropriate partner, but the result of the initiative from non-governmental parties.

5. Selection market party
Changed economical conditions made earlier estimations not realistic anymore. Before the next phase, the process has been ended, which means that the construction cooperation structure (6) in which the model of cooperation should be formalized, the practical development (7), with the area development initiative, feasibility, realization and exploitation aspects never have fully been developed.

8.5 Total economic value, economic and financial drivers

Table 10 illustrates the outcome of a formal cost benefit statement according to the procedure designed by the Dutch research agency of STOWA (see www.mkbainderegio.nl) . This explicit way of presenting the outcome of a societal cost benefit analyses indicates that the proposed project (Brienenoord plan) results in a welfare increase of 21 million Euros.

Main points	
Used discount ratio	2.5
Staring year of the project	2007
Duration of the project	20
	€
Cash value costs	**875768**
Bank management	175768
Nature friendley bank	700000
Cash value avails	**21849960**
House value	528000
Hotel revenues	15978891
Intrensic natur value	16
Sheerproduction	79894
Recriational fishing	4450121
Hicking	14093
Restriction of temporary storage of goods	798945
Net cash value	**20974192**
Remaining impact in the region (quelitative)	
Impact outside the region (qualitative)	

Table 10: CBA Brienenooord plan13 februari 2007

Despite of a net gain at a macro level the project was not implemented. Only some minor parts of the master plan are realised (building of a small bridge and quay recreational boating). Major parts of the plan were rejected because of the institutional arrangements related to the financing of the projects (potential hotel owner should cover the financial risks) and processes of permits related to:

- spatial planning;
- exploitation of hotel and other recreational and nature development of the area;
- temporary storage of dangerous gasses (in boats) along the island.

The arguments for individual stakeholders to retreat from the plan are:
- WWF:
    - nature value is too low.
- Inhabitants of nearby houses (directed located at river):
    - the 70 meter high hotel will take away their river view.
- Real estate developer:
    - financial risks in period of economic recession.

8.6 Conclusions and recommendations for up scaling of the lessons learned

Some recommendations can be made for the establishment of specific institutional arrangements that enhance the transfer of macro-level, implicit values to explicit cash flows on the micro level.
- Arrangements for the transfer of knowledge (www.mkbainderegio.nl)
- Public private partnership (PPP) in the realization, financing and distribution of risks of projects concerning space for the river. The following choices have to made:
    - For project (I) or process (II);
    - For concession (a), project development (b), alliance (c)
    - Design-Build (1), Design-Build-Finance-Maintenance (2), Build-Operate-Transfer (3) or Build-Operate-Own-Transfer (4)

When these choices have been made, the most appropriate institutional design for useful economic drivers will be the direct result.

9. Conclusions and recommendations

Economic drivers can be found in macro- (welfare) and micro- (cash flow) level and divided into implicit and explicit values.

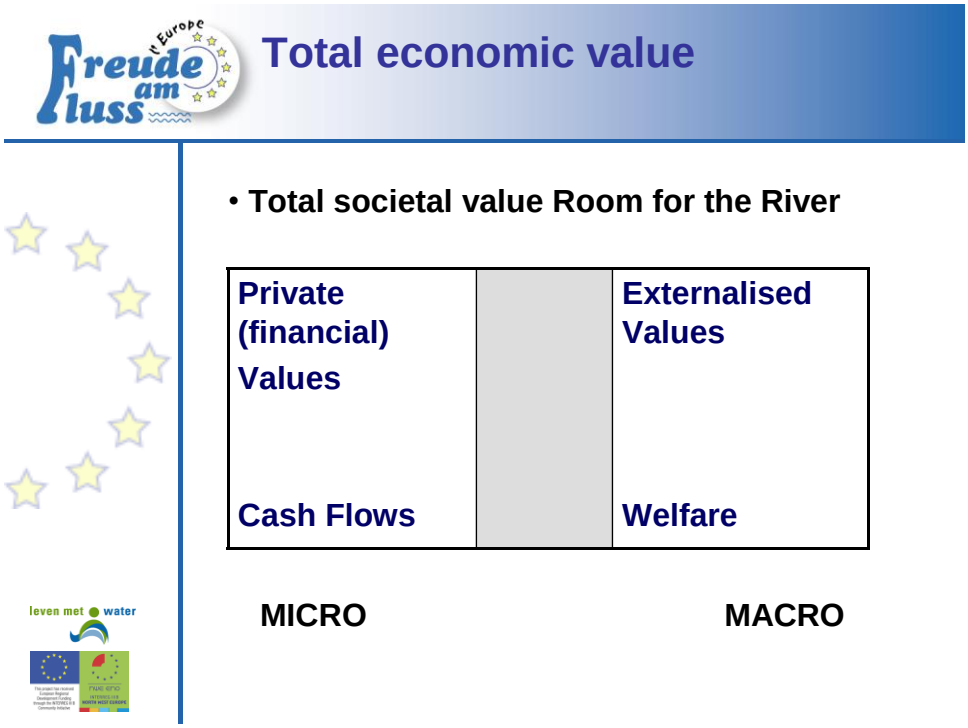


Figure 15: Total economic value

Using the Capturing-Total Economic Value Framework and the Institutional Arrangements 7-Phase-model can be of help to find the appropriate economic drivers. Herewith the establishment of specific institutional arrangements that enhance the transfer of macro-level, implicit values to explicit cash flows on the micro level can be stimulated.

Some institutional arrangements can play a role:

- arrangements for the transfer of knowledge like a more transparent Costs and Benefits calculation Tool (for example on a website at the level of a water board like www.mkbainderegio.nl (STOWA)
- public, private or public private partnerships in the realization, financing and distribution of risks of or processes or projects concerning space for the river
- facilitating of a faster process of permitting
- mobilization of stakeholders with positive side effects with respect to health and ecological values

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